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ART. I.—*Journal of the Mission which visited Bootan, in* 1837-38, *under Captain* R. BOILEAU PEMBERTON. *By* W. GRIFFITH, ESQ. *Madras Medical Establishment.*

(Continued from page 211.)

PART II.

[*Remarks on the nature of the country, especially its vegetation, boundaries, and divisions—its government, population, sects, character, customs, manners, and diet—political relations.*]

The following remarks suggested themselves to me during the bird's eye view I had of Bootan; their superficiality is only to be excused by the shortness of my stay, the want of proper interpreters, the jealousy of the Booteas, and extreme mendacity of such of their Bengal subjects from whom, in my total ignorance of the Bootea language, information was alone to be expected. And as I had daily opportunities of seeing the constancy with which the head of the Mission amassed all available information, I contented myself with remarking on external rather than internal objects, on the face of nature, rather than on that of men. Bootan, I need scarcely observe, is a mountainous country, forming a considerable part of the most magnificent chain of mountains in the universe; in it are to be found all degrees of elevation, from 1000 to 25,000 feet. In its extent it is rather more limited than was supposed, since Capt. Pemberton has ascertained that the country to the eastward, which is ruled by the Towang Rajah, is directly dependent on, and forms a portion of the Lhassa government.

The boundaries of the country are, Thibet to the north; the plains of Assam and Bengal to the south; Sikkim to the west; and the Kampa country to the east. Its greatest breadth will hence be about 90, and its greatest length about 210 miles.

The physical aspect of this country, so far as regards its most essential point—mountains, presents perhaps but little deviation from that of other parts of the Great Himalayan chain; but on this point I am unable to give any information. Every variety of surface was met with, from bluff-headed to peaked highly angular summits. In some places the paths were built up the naked faces of precipices; in others, very considerable elevations might be attained by very gradual ascents, over a sufficiently practicable country. The two most rugged and most peaked were, as might be expected, the two highest—Dongdola and Rodola: the others, which generally averaged 10,500 feet, were very easy. Of the rivers, which are in all cases mere mountain torrents, nothing need be said. The largest we saw was the Monass, which forms the principal drain of the eastern portion of Bootan. No lakes appear to occur: there is below Santagong a jheel of small extent, but it is of no depth, and does not derive its presence from springs or the embouchure of small tributaries. It abounded with water fowl, and was choked up with sedges, and a plant belonging to the family *Hydropeltidæ*, hitherto not, I believe, found in India. Neither is Bootan a country of valleys; in fact, with the exception of those of Bhoomlungtung, Byagur, and Jaisa, we saw none worthy of bearing the name. That of Punukka owes its existence to the vagaries of the river, as its only level part has obviously at some previous time formed part of its bed. The three valleys otherwise mentioned are, if viewed in comparison with other valleys situated in similarly mountainous countries, perfectly insignificant, for they consist of a gentle slope from the bases of the contiguous hills to the bed of the draining stream. The valley of Tassisudon is probably of like extent with that of Punukka, but Turner's accounts are so little to be relied on, that even in a simple matter like this no just conclusion is to be formed. I have only to add, that the three valleys are represented as being close to some of the passes into Thibet: this alone is perhaps sufficient to account for their great elevation.

Hot springs occur one day's journey from Punukka, and appear to be the resort of many invalids, victims to the most frequent disease, lues venerea. From specimens procured by our guide, Chillong Soubah, there must be at least two springs; of one the water is of a yellowish tint, and highly sulphureous; that of the other is limpid, and possesses no sensible properties. I did not hear of the existence of such springs elsewhere.

Of the climate, which is necessarily so varied, it would be useless to attempt to give an account; indeed the only two places of the climate of which the mean could be given for even one month, are Tongsa and Punukka. The mean for the month of March at Tongsa may be estimated at 56° 3′, the maximum heat between the 6th and 21st instant being 63°, and the minimum 51°. I have elsewhere stated the results of the observations made at Punukka. Throughout the barren portions of the country, which are so generally limited to inconsiderable elevations, the heat must no doubt be great during the summer months; at Punukka in April the sun was found very incommoding after 9 A. M; and as a proof of the heat at such elevations as 7000 feet in some places, I may readvert to the culture of rice at, and above Tongsa. The ravines are, however, very narrow about this place, and the faces of the mountain on which the cultivation occurred had a western aspect.

In very many places, however, more abstracted from the influence of radiated heat, delightful climates may be found. It is curious, though not singular, that the best situations were always found occupied by Gylong villages. Considerable elevation is, in addition to other minor causes, requisite at least for a Bootea, during the summer months: thus the Gylong villages were rarely seen under 8000 feet, and oftener about 9000 feet; and the chiefs find a summer change of residence necessary, during which they repair to elevations varying from 7000 to 9000 feet.

The change in the Deb's residence from Punukka to Tassisudon in the summer, and vice versa in the winter, is to be accounted for, especially the latter change, on principles of equalization; that is, the ryots about the one place are obstinate enough to refuse supplies for more than six months; such at least was the story heard by us, although it is rendered doubtful, by the total want of regard evinced by the rulers of the land for the interest of their subjects. The most delightful climate we experienced was that of May at Chupcha, which is situated on the steep face of a mountain with a south west aspect, yet the temperature ranged from 46° to 51°. A week afterwards, and we were exposed to the unmitigated fierceness of a Bengal sun at the hottest time of the year.

The most disagreeable part of the climate of Bootan exists in the violence of the winds, more particularly in the valleys. The direction of these winds, which are very gusty, is invariably up the ravines, or contrary to the course of the draining torrents, no matter what direction these may have; the winds therefore are dependent upon local circumstances, as might be expected from the dryness of the

soil, and its effects on vegetation. The winds are more violent throughout the lower tracts than elsewhere, and as in many of these places they are enabled to supply themselves with dust, they often became very positively disagreeable, and formed no inconsiderable part of the annoyances we were subjected to during our residence at Punukka. These partial winds* are frequently so violent as to unroof the houses; it must be remembered, however, that the roofs are generally mere shingles, kept in their places by large stones. During our stay at Punukka, the regal or sacred part of the roof was blown off; the clattering that ensued from the falling of the copper plates, mixed with the noise of the shingles and stones of other parts of the palace, was very great; a deputation was immediately sent from the palace to request that we would fire off no more guns near the palace, and we found out afterwards that we were looked upon with a very suspicious eye.

We were not much incommoded with rain, neither should I consider it to be abundant throughout the lower elevations, at least no part of the vegetation I saw in such tracts seemed to indicate even a small amount of moisture. We were only once delayed by snow, and on our return enjoyed uninterrupted fine weather until we reached Buxa, where, as might be expected from its proximity to the plains and the season, the weather was unsettled.

As regards quantity of vegetation, Bootan exhibits, it appears to me, considerable peculiarities. In the other parts of the Himalayan chain I have seen, and generally throughout India, the bases and lower portions of the mountains are the most thickly wooded, and it is generally a tolerably certain indication of elevation when less wooded tracts are met with; but in Bootan not only is the vegetation of the lower ranges contiguous to the plains unusually scanty throughout a considerable part of their extent, but throughout the interior it is generally absolutely barren within certain elevations. This scantiness at the base of the mountains is perhaps at its maximum due north from Gowahatti, in which direction the vegetation is almost entirely gramineous; to the westward it certainly lessens, but even to the north of Rungpore (Bengal) the woods are thin, especially when contrasted with the Toorais of other portions; at the same time the vegetation of the lower ranges is in this direction nearly as dense as it is elsewhere. Of its extent to the eastward I have no actual evidence to offer; but as to the north of Jeypore there is a well defined Toorai, and

* The general winds have, it would appear, the usual direction; that is, they blow from the plains.

as to the eastward again, it would appear to *again* become deficient: it probably is irregular in its distribution, and depends consequently on local causes.

But while there is such difference in the amount of vegetation along the tract at the base of the mountains, the vegetation on these up to an elevation of 1600—3500 feet is uniformly scanty, except to the westward, in which direction, as I have mentioned, they do not differ in absolute amount from the well wooded mountains to be seen elsewhere.

Between Dewangiri and Punukka we found that the surface of the interior below 5000 feet in elevation was uniformly very barren, and after crossing the ridge above Telagoung we found similar appearances, but with a very dissimilar vegetation, at elevations of from 7000 to 11,000 feet, but they were by no means so uniform or so general. Throughout the barren tracts* of the first of the above portions of Bootan the vegetation consists for the most part of grasses, among which a few low shrubs occur. The arboreous vegetation is confined almost entirely to *Pinus longifolia*, which is very commonly much stunted. The barren tracts to the westward of Telagoung were remarked almost entirely along the Teemboo, the southern face of the ravine of which was generally remarkably barren, even at very considerable elevations. Grasses did not form here so predominant a portion, shrubs on the contrary abounded, and among these the most common perhaps was a species of *Rosa*, very much like the *R sericea* of Royle's Illustrations.

In Bootan it is only at high elevations, and under certain circumstances, among which aspect and especially humidity are the most important, that the grand forests which have excited the admiration of all travellers in the Himalayas to the westward, make their appearance. The requisite elevation is scarcely ever less than 7000, and is generally about 8000—8500 feet; at such, oaks, magnolias, rhododendrons, and several species of firs attain to great perfection. Between, or on the borders of the woods, patches of swards, adorned in the spring with beautiful herbaceous plants are frequently met with, and form the prettiest object in the whole scenery of Bootan. The vegetation of such, and of much higher elevations, is generally well diversified, until indeed one reaches an elevation of 11,500 feet; at such I found it generally reduced to black firs, stunted junipers, and shrubby rhododendrons, the bulk, as regards amount of species,

* These lower mountains are very frequently curiously marked with transverse ridges. These have much of the appearance of ancient terrace cultivation, but on inquiry I was assured that such was not their origin.

consisting of herbaceous plants, whose growth is confined to a very few congenial months, and which were almost all hid from my view by the heavy snow, so constant between the latter end of October and the commencement of May. Another striking feature in Bootan is the constancy with which southern faces of mountains are, especially towards their summits, bare of trees or shrubs; this it has in common with other parts of the Himalayas both to the westward, where it has struck all travellers, and to the eastward, as on the Mishmees. I am not prepared to state whether any satisfactory explanation of this has been given; it struck me to be due, in Bootan at least, to the searching severity of the winds, which are quite sufficient to keep down all luxuriance of vegetation. Whatever the secondary causes may be, there can be no doubt that the primary one is due to the influence of the south-west monsoon, to which all these faces of the Himalayan mountains are freely exposed.

The higher the altitude the greater, as indeed might be expected, was the uniformity of vegetation, and it was only in such that any general features of vegetation could be said to occur. A very constant feature of high altitude, such as from 11,000 to 12,500 feet, existed in the black fir, a lofty tabularly branched tree of a very peculiar appearance, in comparison at least with other Bootan species, and which, when seen standing out in dark relief, might, from the very frequent mutilation of its lower branches, be mistaken at a distance for palm; with these there was as nearly a constant association of the same species of other plants. The most striking among the partial features of the vegetation of Bootan was presented to us by the three valleys, so often alluded to; these may well be called the region of pines of that country. The range of the three species was most distinct and very instructive, although the Smithian Pine, a little further to the westward, descended to a somewhat lower elevation than it did in the tract above mentioned.

Still more partial features were presented by the *Pinus excelsa*, and more especially by the *Pinus longifolia*, the distribution of both of which appears to depend on local causes. The latter species was not seen on our return, nor was there a vestige of a fir visible after reaching Chuka; no species but the long-leaved was seen below 5500 feet.

I have in the foregoing few remarks merely glanced at the most familiar features of the botany of Bootan. As the importance of strict determination has been much insisted on before correct views can be formed of the botanical geography of any country, I have purposely omitted all details, until the collection shall have been duly examined; but even when this has been done, the difficulties are almost insuper-

able, for although Roxburgh died thirty four years ago, and the number of plants indigenous to India has been increased fourfold since that time, the means exist of determining but a very few more than those described by Roxburgh himself. It is familiar to all botanists that of the 8000 species distributed eight or ten years since by the Honorable Company, not more than 1000 have yet received their promised share of elaboration.*

Bootan is divided into provinces which are ruled by Pillos, of whom there are three—the Paro, Tongsa, and Tacca: they derive their names from their respective residences; the rank of the two first is, I believe, equal, and they are admitted into council, while that of Tacca Pillo is very inferior.

The provinces are again divided into districts, equivalent to Soubahships; of these there are several. The Soobah's jurisdictions through which we passed were those of Dewangiri, Tassgong, Tassangsee, Lenglung, and Byagur, all of which are in Tongsa Pillo's province. After leaving Tongsa we came into the province of Punukka, and after leaving this capital we came on the tract attached to that of Tassisudon, or as it is called Tassjeung. The Soobahs all exercise supreme jurisdiction within their own limits, but pay a certain annual amount of revenue to their respective Pillos. The Soobahs of Dewangiri and Buxa are of subordinate rank.

But besides these governors of provinces, and governors of districts, there are other officers of high rank, who assist in moving the machine of government; they do not however make good exemplifications of the proverb, "in the multitude of counsellors there is wisdom." The offices of these additional counsellors are as follow—the Tass Troompoon, or warder of the palace of Tassisudon; the Puna Troompoon of the palace of Punukka; and Wandipore Troompoon of the castle of Wandipore; then there is the Lam Trimpe on the part of the Dhurma, and Deb Trimpe on the part of the Deb.

* The following passage was erased from the proof of Dr. Griffith's M.S. in the office of the Secretary to Government. We insert it as a note, on Dr. Griffith's and our own responsibility, and in the confidence that Dr. Wallich can readily give a full and a satisfactory answer to the implied charges.—Eds.

"Had Dr. Wallich never been in India the matter would have been otherwise, as it would not then have been a matter of policy to remove every vestige of an Herbarium from the Botanic Gardens, and to publish a confused catalogue of names without characters. As the matter now stands, Indian botanists are reduced to this,—they must either give up all the advantages they possess by being in India, and wait until all the species, amounting to 3 or 4,000, named by Dr. Wallich have been described by others in Europe from dried, and in many cases very imperfect specimens, or they must in no case acknowledge the authority of any body to name an object without giving it a character, and publish such new species as they may deem to be new with their names and their descriptions."

The supreme authorities are the Dhurma and Deb Rajahs; the latter representing the temporal government in its strictest sense, as his reign is generally short; the former the spiritual in as strict a sense, for he is, although infinitely divisible, quite eternal. The immortality of the Dhurma is not so well known as that of the Lama of Thibet, it is nevertheless equally true; both appear to have been firmly believed by Captain Turner, whose account of the behaviour and intelligence of the Grand Lama, an infant of some months old, is very amusing and characteristic. The present Dhurma is, as I have mentioned, the son of Tongsa Pillo, a curious coincidence.

The chief test of the authenticity of the infant in whom the Dhurma condescends to leave the regions of æther for those of gross spirits, consists in his recognising his former articles of wearing apparel, &c.; and to avoid any supposition that might arise from the probability of any mortal child being struck with shewy gew-gaws, this child is bound to assert that they are actually his own; if it does so, surely it is satisfactory evidence. The infant Dhurma may as well be found in the hut of the poorest peasant as in the residence of an officer of high rank, but I dare say, if the truth were known, he is usually made for the occasion.

When he has been completely tested he is removed to the palace, and his life thenceforward becomes one of almost absolute seclusion. Surrounded by hosts of priests, and in the apparent enjoyment of most things deemed desirable by a Bootea, he is nothing but a state prisoner, virtually sacrificed to state ordinances. Neither is it probable that he enjoys any power sufficient to recompense him for being cut off from the merry side of life, for if his teachers have been wise teachers, they probably rule him throughout. But all this holds good only on the supposition that his life is as really monastically rigid as those of some orders of Christian monks were not. We heard strange accounts, especially at Punukka, sufficient to suggest that a priest is not necessarily virtuous in Bootan more than any where else.

His revenues are, I believe, derived from certain lands in the plains, and above all from offerings. He is also said to trade, but none of them can derive much profit from commercial speculations.

It is in the Deb that the supreme authority as regards the internal economy of the country is vested. But supreme though he be called, as he can do nothing without consulting all the counsellors, including the Pillos, who have no cause to dread his displeasure, his power must be extremely limited, and very often disputed; and, if it is remembered that he is always checked by those counsellors who are actually present with him, and that he holds no, or at least very little, territory

on the plains; and that a Pillo has no check on himself, that his province is perhaps remote from the capital, and that he has filled up all his offices with his own relations and friends, it is evident, I think, that the change from governor of a province to that of supreme ruler of the country must be attended with loss of power. Besides, the Deb is only expected to retain office for three years, at the end of which he is expected to retire, provided he be weak enough.

The present Deb, if indeed he now exists, has no authority out of Punukka, and not too much even in his own palace. He was formerly Tacca Pillo, and this seemed to be the grand source of complaint against him.

The chief object of the Deb, as is that of all his officers, is to accumulate money. The sources of this are plunder, fines, reversion of property to him by death of the owners (and this seems to be carried to a frightful extent), tributes from the Pillos, offerings on accepting office, trading, and the proceeds of lands in the plains; but this last source cannot yield much, since the occupation of the best part by Herr Govindh. Our Deb, in addition to his usual sources, added another during our visit, by robbing the Dhurma of all his presents. The revenues of the Pillos are derived principally from their Dooars, or territories in the plains, by plunder either of their own subjects, or those of the British government, fines, in short by every possible method.

Nothing can be said in favour of this many-headed government; each Deb, each Pillo, each Soobah, each officer in fact of high or low degree, is obstinately bent on enriching himself at the expense of his subjects or his inferiors; and their object is to do this as rapidly as possible, as removals are always probable, and are almost sure to depend upon a change of the Deb. There is no security for property, and not much for life, but fines are fortunately deemed more profitable than bloodshed, and, in short, the only safety of the lower orders consists in their extreme poverty. The whole proceedings of this government with the Mission were characterised by utter want of faith, honesty, and consideration. The trickery, intrigue, and falsehood could only be equalled by the supreme ignorance, presumption, and folly exhibited upon every occasion. Procrastination was a trump card in the game they played, mildness of deportment was pretty sure of inducing insolence, and they were only kept in decent order by perceiving that you were determined not to be trifled with.

I am not disposed to assign their behaviour to the nature of the present temporary government; it was only natural in an ignorant, very conceited people, who find that they are treated with distinguished consideration by the only power that admits them to an equality. The

preceding Deb, from convictions of interest, and from having tasted more than once of British liberality, might have treated the Mission with some consideration, but the issue as to business would doubtless have been the same. I regret much not being able to state more about the government of the country, and more especially its internal economy. The usual punishment for crimes is in fines, a method always resorted to wherever money is considered as the grand object. In Bootan I have little doubt but that the commission of grievous crimes would be encouraged, were the lower orders in condition to pay the fines.

I have before adverted to an instance of black treachery: that instance was furnished by a Mahomedan, Nuzeeb-ood Deen, a native of Calcutta; who having accompanied a trader into Bootan had been detained and placed in a state of captivity for twelve years. By some fortunate neglect on the part of the Booteas in the palace, he contrived to gain admission to Capt. Pemberton; and his tale was so consistent, and bore such evidences of truth, that Capt. Pemberton claimed him as a British subject; and the justice of the claim was very strongly urged by the prevarication of the Booteas, who indeed finally admitted it. Nuzeeb-ood Deen returned to the palace, but very luckily for him, Capt. Pemberton, who suspected that the Booteas might dispose of him privily, insisted much that he should be forthcoming when he called for him, and wrote to the Deb to the same purpose; yet even under these circumstances, it was unanimously agreed that he should be cut to pieces and thrown into the river, but they refrained from doing so from fear of the consequences. As soon as he was given up, which happened a day or two before our departure, he placed himself under Captain Pemberton, who advised him not to associate with Booteas, and above all to eat or drink nothing from their hands. Nuzeeb-ood Deen however was not proof against a cup presented to him by a boy with whom he had been very intimate during his captivity. The consequences were every symptom of having partaken of some narcotic poison; he was saved by the action of powerful emetics, but did not recover for some time afterwards; he was carried through the palace and throughout the first march on a Bootea's back.

The *population* of the country is certainly scanty, and indeed could not be otherwise under existing circumstances. Villages are very generally "few and far between," in addition to their being small. The only decently populated bits of country we saw about Santagong and Tamashoo. The valley of the Teemboo as far as Panga was also tolerably populous, but it must be remembered that this is the principal part of the great thoroughfare of the country. The palaces and

castles are the only places well inhabited, but the inmates might very advantageously be dispensed with, as they consist of idle priests in excess, and bullying followers; both too happy to live at the expense of the poor cultivators.

The causes of this scantiness of the population exist in polyandry, and one of its opposites *agyny*, in the bad government, and the filthy and licentious habits of the people. The great rarity of aged people struck us all very forcibly, and is a proof that whatever may be the proportion of births, the proportion of life is below average. The bad influence of polyandry is supposed to be counteracted by the idea, that the spouse of many will be faithful to the eldest so long as he may be present, and after him to the second, and so on;—such an idea is at best absurd, and as regards Bootan women, is positively ridiculous, their chastity not being of such a quality as to induce them to be particular as to relationship, or even acquaintance.

The expected celibacy of so large a portion of the inhabitants, although probably assumed in some degree, and which depends either on acceptance of office or on the course of education, must be very pernicious. The large number thus withdrawn from propagating—the only good in their power—would lead us to suppose that polygamy would be of much more likely occurrence than polyandry; and the custom is rendered still more paradoxical by the contrariety of custom observed amongst most other Asiatic people, who make polygamy almost an invariable consequence of worldly prosperity.

In very many places there is obviously an extreme disproportion of females to males, yet it would be too much to assume that there is a general disproportion, although the two causes above adverted to be would sanction such a belief, unnatural as it may supposed to be. We could not ascertain that the apparent disproportion of females was the result of unnatural conduct on the part of the Booteas, although in my opinion they are sufficiently capable of destroying either male or female offspring, did they consider it expedient to their interests.

Of the diseases, which in all countries form so essential a part of the causes tending to diminish population, I know nothing. The few patients I had at Punukka were all suffering from venereal, frequently in its worst form. Chillong Soobah assured me that such cases occur in the proportion of one in five.

The number of half-ruined villages would suggest the idea that the population was formerly more extensive than it now is. But it must be remembered that, in this as well as most other hilly parts of India, the population is partly migratory. In a country where agriculture is not understood, where no natural means exist for renovating the soil,

and no artificial ones are employed, the population must vary their abodes in accordance with means of subsistence. The only cause for surprise is that they should build such substantial houses; they may do so with a view of returning to them after the ground has been sufficiently fallowed.

Education. Of the course of this essence of the growth of the mind I can state nothing. If the assumption of the habits of priesthood be considered as the first step of education, it is rather extensive; but I doubt whether a Bootea boy may not wear these robes for years and then throw them off improved in no good, but in all vice. There is scarcely a village in Bootan in which some exterior decorations, as well as the whole air of the house, do not indicate it to be the favoured residence of a priest; yet I never heard the hum of scholars in any other place than Dewangiri, in which, and it is a curious coincidence, priests were comparatively uncommon.

The Booteas appear to have no caste; they are divided, however, into several sects, and in the account of the Persian sent into Bootan by Mr. Scott, whose account may be found in the fifteenth volume of the Asiatic Researches, as many as fifteen are enumerated. It does not appear, however, that the possession of the higher offices is confined to the higher sects; for Tongsa Pillo is known to be a man of a low sect, although he may be considered, from his station and connexions, the most powerful man in the country.

Most Booteas have much of the same appearance; to this however the people about Bhoomlungtung, Byagur, and Jaisa, as well as those about Rydang are marked exceptions, and have much more of what I imagine to be the Tartar appearance.*

If we look at those sects which do not depend upon blood, but upon education or circumstances, we may divide the inhabitants into labourers, priests, idle retainers, and great men, which is in many places another word for tyrants. The labourers are better acquainted with poverty than any thing else, and are lucky in being allowed to have such a safeguard.

Perhaps the most numerous, and certainly the most pernicious class, is that of the Priests or Gylongs. Their number is really astonishing, particularly when compared with the population in general. Not only do they swarm in the castles and palaces, of which they occupy the best and most exalted parts, but they inhabit whole villages, which may be always recognised by the houses being somewhat white-washed, of a better than ordinary description, and always in the best and

* The people again towards Buxa are of very distinct appearance, but this results from a tolerably free admixture of Bengalee blood.

coolest situations. Of their grades of rank I can say nothing, but much importance seems to depend upon due agedness. The highest were usually admitted to the interviews, and of course expected to be recompensed for the honour they did us; but as they were well contented with two or three rupees, their ideas cannot be said to be extravagant. They are perhaps rather more cleanly than other Booteas, and are reported to bathe publicly every week; but although we frequently saw processions in single files, in all cases headed by a small drum, a sort of gong, a clarionet, and an incense bearer, the priests following according to their seniority, the youngest noviciate ending the tail, I am not convinced but that the bathing part may be more nominal than actual; one thing at least is certain, that the duty, whatever it was, was agreeable, otherwise we should not have seen the processions so often.

They are kept in order in the castles by hide whips, in the use of which some of the brethren are neither sparing nor discriminating. The dress is becoming, consisting of a sleeveless tunic, generally of a chocolate colour, and edged with black or yellow. They are certainly better off than any other class: their chief duty is to be idle, to feast at the expense of the country, and at most, to tell their beads and recite mutterings.

The idle retainers form also a large portion, though by no means equal to that of the priests. As little can be said in the favour of these as in that of those, but they have one disadvantage in not being able to make use of their religion as a cloak for evil deeds. In these two classes all the most able-bodied men in the country are absorbed: they are taught to be idle and to become oppressors, and what is very bad in such a thinly populated country, they learn to look upon the ordinance of marriage, and its usual consequences, as a bar to their own interest. Of the great men I can only say that their influence is undeviatingly directed to the furtherance of their interests; they become governors to oppress, not to protect the governed—they rule by misrule; and as being the sources of the two great evils I have just mentioned—priests and retainers—they are themselves the greatest curse that ever was inflicted upon a poor country.

Of the moral qualities of the Booteas it is not in my power to give a pleasing account. To the lower orders I am disposed to give credit for much cheerfulness, even under their most depressed circumstances, and generally for considerable honesty. The only instances of theft that occurred did so on our approach to the Capital. How strange, that where all that should be good, and all that is great is congregated, there is little to be found but sheer vice; and how strange, that

where good examples alone should be led, bad examples alone are followed.

To the higher orders I cannot attribute the possession of a single good quality. They are utter strangers to truth, they are greedy beggars, they are wholly familiar with rapacity and craftiness, and the will of working evil. This censure applies only to those with whom we had personal intercourse; it would be perhaps unfair to include the Soobahs, whom we only saw once, in such a flattering picture, but it certainly would not be unreasonable; and I must make one exception in favour of Bullumboo, the Soobah of Dewangiri, and he was the only man of any rank that we had reason to be friendly towards and to respect. In morale they appeared to me to be inferior to all ordinary Hill tribes, on whom a Bootea would look with ineffable contempt; and although their houses are generally better, and although they actually have castles and places called palaces, and although the elders of the land dress in fine cloths and gaudy silks, and possess money, ponies, mules, and slaves, I am disposed to consider them as inferior even to the naked Naga.

They are not even courageous. I am inclined to rank courage among physical rather than moral qualities, yet it could not so be classified in the consideration of a Bootea, in whom other physical qualities are well developed. I therefore consider it among those other qualities which, as I have said, are absent in Bootan. A Bootea is a great boaster, but a small performer. All the accounts I heard of their reputed courage were ludicrous. Turner mentions seriously that one desperate revolution superinduced the death of one man in battle; and we were told that in the late protracted one, the only sufferers were two sick people who were unable to escape from a burning house. In a military point of view they could only make up for their deficiency in numbers by an excess of courage and of perseverance under difficulties. They are not even well versed in the use of their national weapons. The Gourkha Soubahdar who accompanied the Mission looked on them with the utmost contempt, and this knowledge he had gained by long experience. In Mr. Scott's time a handful of Assamese sebundies would take stronghold after stronghold, and lead off all the tenants, excepting the defenders who had run away, as captives; and very lately 700 Booteas, with every advantage of ground, were totally routed by seventy of the same sebundies. Their courage may therefore be written down as entirely imaginary.

Their ideas of religion appear to be very confused; religion with them consisting, as indeed it may do among other more civilised people, of certain external forms, such as counting beads, and mutter-

ing sacred sentences. The people throughout are remarkably superstitious, believing in an innumerable host of spirits, whose residences they dare not pass on horseback; and while they are near these abodes they keep the tenant at bay with vollies of incantations. The offerings to these spirits are usually flowers, or bits of rag; this practice they have in common with most of the tribes to the extreme east of Assam.

Of any marriage ceremonies I could not hear; but as chastity would appear to be unknown, no particular forms are probably required; nor do I think that there is a particular class of prostitutes. We all had opportunities of remarking the gross indelicacy of Bootea women; of this and of their extreme amiableness, the custom of polyandry is a very sufficient cause. So far as I could see, there is no distinction of rank among Bootea women, and those only are saved from the performance of menial duties who are incapacitated by sickness or age.

If the account given by Mr. Scott's Persian of the ceremonies attendant on birth be true, another sufficient cause exists for scantiness of population, as well as for a disproportion of women. He asserts that the second day after birth both child and mother are plunged into the nearest river; but so great is the dislike of a Bootea for this element, that I am inclined to discredit the account, and more especially as regards the mother.

The disposal of corpses is much the same as among the Hindoos: the ashes of the body are collected, and are, I believe, thrown into the nearest river. The ceremonies, of course, begin and end with a donation to the officiating priest. The only part of them I witnessed was the burning, and this only in one instance; it was done in a slovenly and disgusting manner.

Of the social habits, little favourable could be said in any place where the women are looked on as inferior beings, and used as slaves. The men generally are excessively idle, and spend most of their time in drinking *chong*, for the preparation of which, as well as that of arrack, there are provisions in most houses. I do not think I ever saw a male Bootea employed, except indeed those who acted as coolies. All the work in doors and out of doors is done by women, to whom about Punukka Assamese slaves are added. The men are great admirers of basking in the sun, and even prefer sitting shivering in the cold to active employment.

I need scarcely add that both sexes are in all their habits inexpressibly filthy. The women in their extreme indelicacy form a marked contrast with such other Hill tribes as I am acquainted with.

The only use either sex make of water is in the preparation of food

or of spirits—no water ever comes into contact with any part of their person; they scarcely ever change their clothes, especially the woollen ones. The people about Bhoomlungtung are far the dirtiest, and as they wear dark woollen cloths, rendered still darker by long accumulation of smoke and dirt, they look more like representations of natives of Pandemonium, than of any place on the earth's surface.

As they, at least the official part, are very assuming, so does state enter largely into all their proceedings. All our interviews with them were conducted with all possible state on their part; and that exhibited to us at Tongsa and Punukka, was striking enough, and will ever after form in my mind as bitter a satire upon state as one could well wish. The effect was much lowered by the usual Asiatic want of arrangement, by an assumption of superiority among the inferiors (probably enough at the instance of their superiors), and by the admixture of the *profanum vulgus*, who had no opportunity of hiding inherent dirt under fine robes. On these occasions the behaviour of the chief was certainly gentlemanly, but the impression was soon obliterated by a messenger overtaking us, probably on our return, for another watch, or another telescope, or any other thing. In personal appearance I did not observe much difference between the higher and the lower orders, with the exception of the ex-Pillo of Tongsa, who seemed to have the best blood in the country concentrated in him. The presents given as returns of the magnificent gifts of the Governor General were beggarly; and yet there was a good deal of parade in their exhibition. To us narrow silk scarfs were always given, occasionally varied with a foot and a half of blanket. The scarfs are habitual gifts among all the upper classes, and very generally form the inner envelope of letters.

Fine woollens and embroidered China silks form the dress of the nobles; thick cotton or woollen doublets or tunics are common to every body else, but the chiefs probably have similar dresses in private, at least their principal officers certainly have; and the only difference in such cases is the belt, from which the *dha* is on occasions suspended these are embroidered, and have a rich appearance. The dress of all is certainly cumbrous, especially when the peculiarly Chinese boots are donned. The boots of the higher orders are certainly not made in Bootan; those of the lower orders consisted of a foot of some skin, with party-coloured woollen leggins, which lie above the calf. They are worn by both sexes.

The general receptacle for odds and ends, and a most capacious one it is, is between the skin and the doublet. Into this, which (consequent to one side being formed by the body) is not of the cleanest description,

every thing is thrust, from a handful of rice to a walnut, from a live fish to a bit of half putrid dried meat. Tobacco is carried in a small pouch suspended from one side.

A *dha*, or straight sword of a heavy description, is worn by all who can afford it, and the belt of this secures the loose doublet about the waist, and prevents the innumerable deposits therein from falling down. Those who cannot wear *dhas* from poverty, wear ridiculous looking knives, which dangling from the belt have a very absurd appearance. It is lucky that the people are not quarrelsome, and not inclined to resist the followers of chiefs, otherwise from the men being so generally armed, and so generally addicted to drinking, assaults might be expected to be of common occurrence; I only saw however one instance in which a man had been wounded. I certainly shuddered at times, expecting every moment to see adverse parties multiply each other by division; but latterly I was persuaded that cutting blows were rarely resorted to. The end of these disputes, which barring the blows were very fierce, was always brought about by the arrival of some third person, who by espousing one, espoused the stronger cause, and when this was done the weaker withdrew, or was made to withdraw by blows with the flat side of the weapon.

The accoutrements of a man of war differ, so far as his mere dress goes, in nothing. His defences consist of a well quilted iron skull-cap, which, when out of danger, is worn slung on the back; lappets are attached to it which defend the face—perhaps from cold. They also carry circular leathern shields, apparently of rather good manufacture. Their weapons of defence are first the *dha*, which is a heavy unwieldy weapon, without any guard. They are worn on the right side, but this to us awkward mode of wearing does not hinder a Bootea from disengaging his weapon readily, the sheath being first seized by the left hand. A blow from this weapon must cause a desperate wound, and judging from their quarrels, in which not a vestige of any skill in self-defence was shewn, the first blow, when actually struck, must decide the matter. Their fire arms, which are all matchlocks, and which vary in size from musketoons to huge wall pieces, are contemptible: they are of Chinese manufacture. Their powder, which they manufacture themselves, is powerless; indeed in one sense it may be considered as positively lessening power, for Captain Pemberton and Lieut. Blake ascertained that in ordinary charges it could not cause the discharge of the wad, and hence it actually weakened the cap. To remedy this badness they put in very large charges, but after all they seem to depend more on the effect of the noise than on that of the missile, for so little reliance is placed on this, that the marksman is

said to follow up the discharge by the piece by the discharge of a stone. It is likewise said that few venture to take aim except with the stone; they generally attach the gun to a tree, and without pointing it consider that they have performed a dangerous feat by causing its discharge. All the musketeers I saw, even when there was no ball in the gun, certainly averted their faces very studiously when the due fizzing of the powder warned them that the explosion would soon come on.

The most common weapon next the *dha* is the bow: this we only saw practised at Dewangiri, and the result was not alarming. The bows are longer than ordinary, at least so they appeared to my inexperienced eyes. It must be remembered that they do not, as in some more civilised places, fire at marks the size of an ordinary house. The mark which we saw was a small battledoor-shaped piece of wood, the distance was 150 yards, and the situation of the mark was pointed out by branches of trees; scarcely an arrow alighted within reasonable distance, yet the mark bore several marks, which we knew were made for the occasion. Each archer was very noisy in applauding his own skill, and challenging the others to equal it.

The dress of the women likewise consists of a loose garment, and is very similar to that worn by Hill tribes to the eastward of Assam. They have very few ornaments: the chief ones consist of a plate of silver fastened round the head, and crossing the upper part of the forehead, wire ear-rings of large dimensions, and peculiar rings fastened to a straight silver wire and worn projecting beyond the shoulder. They appear to be fond of flowers, and frequently decorate themselves with garlands, particularly of the scarlet rhododendron and the weeping willow.

The diet of the lower orders is very, very poor; they appear to live entirely on grain of an inferior nature, or in the wheat districts on coarse, abominably dirty chowpatties. There can be little doubt but that in many places they are not unfrequently much pinched by want.

The chiefs and their followers, and the inmates generally of the castles, live chiefly on rice brought from the plains; they likewise consume much dried fish, and very likely not a little dried meat, which they prepare by means of fire and smoke. They are as strict in their ideas of not eating flesh of living animals as the Burmese are; and they are beyond doubt very fond of animal diet: the salt is I believe brought from Thibet: they eat with the hand.

Their beverages are in the first place tea, but this is I believe used only by persons of some rank or property: they procure this from

Thibet, in the form of huge flat cakes: it does not possess a particle of aroma. Still more common is the beverage called *runga pat*, which may be likewise used for the tea; if their accounts can be relied on it is prepared from the leaf of a pear or medlar. I had no anxiety to taste it as it was of a muddy appearance and reddish colour.

Of intoxicating fluids they have two; one of these is merely fermented, and is known by the name of *chong*; it is a vile preparation from rice, made in the same manner, but very inferior in quality to that used by the Singphos. To this drink, which is not strong, they are immoderately addicted, and it generally is carried with them on journeys in large horns made from the horns of the *Mithan*.

The distilled liquor I had one opportunity of tasting; it was very clear, and much resembled weak whisky, as the Soobah had I imagine diluted it prior to distribution to the spectators.

The *political relations* of the country are as limited as the boundaries. With *Sikkim* they appear to have no intercourse. In the Kampas to the eastward there is some reason to believe that they pay an annual tribute. That they are tributary indirectly to Lhassa, and now directly to China, there can be no doubt, although the official people most strenuously denied it. It was affirmed indeed that a considerable time ago the Chinese were in actual possession of the country, but relinquished it finally on account of its poverty. China also exercises its authority in inflicting fines on them, and keeps guards on all the passes into Thibet. The tribute is taken I believe annually to Lhassa accompanied with an envoy. With the British government its chief relations have existed owing to the occupation of certain tracts in the plains called Dooars, from their being situated near the passes into the mountains. These tracts are of considerable extent, and are held by the Booteas on toleration, as the tribute they are under the obligation to pay is not only so small in amount as to be quite nominal, but is generally allowed to lapse into arrears.

In assigning the continuation of the possession of these tracts wherever an accession of dominion was gained, the British government acted with its usual liberal policy; but this liberality has been so little appreciated by the people of Bootan, that the system, as it has worked hitherto, has been fraught with mischief; it has been most positively injurious to the territories in the plains, and it is, I think, injurious to Bootan itself.

We had ample opportunities of observing the extremity of misrule to which the Dooars in Assam as well as those in Rungpore are subjected by the infamous government of the Booteas, and it was the more striking from the contrast presented by our Assamese territories,

and as much so, by those of Cooch Behar. The crossing of a river eighty yards wide is sufficient to carry one from a desert into a country, every inch of which is highly cultivated; yet the richness of the soil is in favour of the tracts immediately contiguous to the Hills, and such are, in Assam at least, especially esteemed by the most laborious part of the population, the Kacharies; and were it not for this predeliction in favour of these tracts, and the short-sightedness peculiar to a native population, by which immunity from taxation is preferred to security of property, the Assamese Dooars would rapidly become totally depopulated.

A gift long granted as a favour, in the eyes of an Asiatic, is soon considered as a right; and although the Bootea government has received some severe lessons in the shape of capturing their impregnable places, and of a resumption of portion of the Plain tracts, yet the free and quick restoration of the same on apologies having been made, with copious professions of better behaviour in future, has been attended with a very different result from that which would be occasioned by gratitude. The very severe lesson which they were taught in 1836, in which they were completely disgraced by being defeated by a handful of sebundies, and then punished by losing a Dooar, has taught them nothing. That very same Dooar, perhaps too liberally restored, has been for some months seizable for arrears of tribute. Nor is this all; since that restoration it would appear that their officers have become more than usually insolent. I think that it may fairly be assumed, that they argue on the certainty of restoration, so that a good foray might possibly, if its consequences were only temporary resumption, be a source of profit to them. By the plan of allowing barbarians to hold country in the plains, the inhabitants of those plains lose a portion of their most fertile soil; many of them are besides exposed to all the inconveniences and dangers of an unsettled frontier, for such must such a frontier be;* and hitherto it has not been attended, at least in many places, with the expected effect of securing the friendship of the Booteas, and the quiet of the frontier.

But no argument can place the matter in a clearer light than the facts connected with Herr Govindh, a subject of Bootan, but who is now independent both of Bootan and of the English government, and who therefore enjoys considerable tracts of country without paying any thing for them; nor can any thing more forcibly point out the weakness of the Bootea nation, for not only does Herr Govindh keep them in effectual check, but he has, I believe, offered to take all the Dooars

* Occupation of such tracts is very favourable to the carrying off of slaves, an habitual practice I have no doubt with the Booteas.

from them, if the government will allow him to pay 40,000 Rupees a year as tribute.

It acts injuriously on Bootan by diminishing the energies of its inhabitants, and suppressing the development of those resources which every habitable country may be supposed to possess. It must be remembered that the cultivation of the Plain tracts is not, as in some other instances, carried on by the inhabitants of the mountains, but by the natives of the Plains, who after reaping the produce of their labour appear to be compelled to take it to the first station in the Hills, from which it is distributed to the appointed places.

In all cases of entreaty for restoration it has been urged that the inhabitants of Bootan cannot subsist without these tracts, but they forget that by labouring in their own country they might supply themselves either with grain, or the means of purchasing it; and further, that the supplies drawn from the Plains are only enjoyed by the chiefs and their followers.

Some distress would doubtless result from immediate and final resumption, but this distress would be confined to the better orders, and would be a due punishment to them; it would in a short time be abundantly counteracted by the reduction of the Gylongs, and by the compulsion of a great number of idle hands to work for subsistence. It would also, I think, have a beneficial effect in lessening internal commotions. The ambition or rapacity of a chief is now readily seconded by the greediness of his idle followers, but were these necessitated to become agriculturists they would certainly not respond very readily to his call; as matters now stand, in short, there is a ruinous drainage of a very fertile tract of country, without any sort of return whatever; for the revenue derived from one Dooar during, a short season that it remained in our hands was amply beyond all proportion to the tribute; and it may fairly, I think, be stated that a country which draws every thing from another, and makes no return, may be compared to a parasite, the removal of which is always desirable, and very frequently essential. The Bootan government has been invariably treated with great liberality by the greatest power in the East, and how has it requited it? It has requited it by the rejection of a treaty which could only be productive of advantage to them, by shuffling mendacity, by tampering with British subjects, and by inconsiderate conduct to a British Mission, evinced in many other ways than that of opening its dâks. They object to forwarding communications to Lhassa, they object to British traders entering their country, and, in fine, they object to every thing that is reasonable, and that would be mutually advantageous. In short,

they shewed themselves to be ignorant, greedy barbarians, such as should be punished first, and commanded afterwards.

The objection raised against the resumption of the Dooars, on the plea that no check will then exist on the Booteas, is one contrived to meet expediencies: it has never been attended with the supposed effect. The affair of Herr Govindh, and the recent victory at Silkabhari are convincing proofs that the Booteas may easily be kept within their own limits. And even arguing the necessity of an increased military force, it must not be forgotten that the same tract which now yields us nothing but a few debased coins, a few inferior ponies, with abundance of disputes and law suits, would in a very short time become equal in richness to any of the neighbouring tracts, rich as these undoubtedly are.

PART III.

[*Natural productions, agriculture, domestic animals, arts, and commerce.*]

Few wild quadrupeds were seen by us in Bootan. Tigers, leopards, and elephants are to be found on the lower ranges, and probably the former straggle up to as considerable a height as they do to the westward. The chief beasts of prey in the interior are bears, but they do not seem to be numerous, and foxes of large size and great beauty: these last are confined to considerable elevations, and none were seen under 8000 feet.

Monkeys as usual abound on the lower ranges, on which the *Hoollock* of Assam likewise occurs. Some long-tailed monkeys occurred above Bulphai, 8200 feet above the sea; and in January I likewise saw a flock of noble ones not far from Tongsa, at an elevation of 5800 feet; these were white, and in form and size resembled the Langoors. Among wild ruminants, I may mention the barking deer, which however scarcely ascend above 4000 feet, and the musk deer, the most valuable wild animal of the country. It would appear to be rather common on the higher ranges, as several skins were brought to us from Punukka; the price for us, of a perfect one, that is without the musk, being five rupees.

The smaller animals that came under our notice were a species, I believe, of Lagomys, which Lieut. Blake found dead on the path, one or two animals of the weasel kind, and rats which swarm in very many of the houses.

Three or four species of squirrel were likewise procured, all from elevations of 5500 feet, yet all were likewise natives of Assam. The

most striking one is a black one, with a whitish belly, measuring, including the tail, nearly three feet.*

The variety of birds is, of course, considerable, but the lower ranges seem to be by far the most productive; on these jungle fowl and two species of black pheasant are found. The raven is found throughout, but the very familiar crow or jackdaw never leaves the plains, and never leaves populous places. Throughout the higher portions of Bootan it has as noisy, but scarcely possibly as mischievous a substitute in a red-legged crow. This is common in the three elevated valleys, and not rare elsewhere at elevations of 8000 to 9500 feet: and below these it is scarcely to be seen. Cuckoos, larks, magpies, jays, and sparrows were the chief European forms met with, but except the latter, perhaps, all were of different species from the birds known by those names in Europe.

The cuckoo is rather widely dispersed. I first heard it about Punukka, and subsequently along the Teemboo, at an elevation of 7000 feet; below this height, at least in this direction, its peculiarly pleasing voice was not heard, although I think I saw the bird considerably lower. With the magpie, which has much of the plumage of the European bird, but a shorter tail, we became familiar at Bhoomlungtung, but lost it at Jaisa. The jay, a figure of which may be seen in Mr. Royle's Illustrations, was found pretty constantly throughout the wooded tracts between 5500 to 7000 feet; it is a noisy, but not a very wary bird. Larks were very common in the elevated valleys, and afforded us some good shooting; in habits, plumage, and voice they are to an uninitiated eye the prototypes of the bird so well known in Europe. In the same valleys Syrases were common. Wild fowl are, as might be expected, rare; the only place where they occurred in tolerable plenty was in the jheel below Santagong. The most destructive and numerous bird is the wild pigeon, which is to be found in plenty in almost every village, and in literal swarms in the castles and palaces: they do a great deal of damage to the poor ryots, who are not allowed to destroy them, on account of their being sacred. This exclusion holds good very strictly about the residences of the chiefs; and, although the villagers were in all cases delighted to see them shot, yet they keep no check on their increase, as they have no means of destroying them, and appear never to have thought of doing so by means of their eggs. At Byagur, the place of this bird was supplied by another very curiously marked species, which, it is said, likewise occurs about Simla.

* *Sciurus beng-moricus*, McCl.

None of the wild birds are made subservient to use; indeed the natives appear to be very deficient in means for procuring them. The sacredness of life may be one reason, but even the most superstitious will eat any bird one shoots, provided it be large enough to promise a substantial repast.

The same remark is applicable to fish, which are common in most streams below 4000 feet. The two most common are the *Bookhar*, which is scarcely found higher than 2000 feet, and the *Adoee*, which is found as high as 4000 feet, and perhaps higher, but its habits render it difficult to see. The *Bookhar* abounds in the Deo Nuddee below Dewangiri; it is from the sport it affords, and the great readiness with which it takes a fly, to be considered as the trout of India. The *Adoee* is said to refuse all bait, and I have found this to be the case not only in this instance, but in all those which have a similarly situated mouth, such as the *Sentoosee*, *Gurriah*, and *Nepoorah* of Assam. At Punukka, where the *Adoee* is plentiful, it is caught by nooses; such as were so caught were all small, and the young anglers were obviously afraid of detection. At this place I saw a solitary instance of the use of a casting net, but I suspect that it was under authority; elsewhere I observed none even of the ordinary rude expedients for catching fish. Both of the above fish are nutritious food, and are so plentiful that they really might form a valuable acquisition to the miserable diet of the lower classes; but this would not suit the benevolent ideas of the priests, who however appear to eat stinking dried fish from the Plains with great sang froid. To the poor in Bootan every thing is denied. Bees appear to be plentiful, but their buildings are passed with indifference by the lazy Bootea.

Of the vegetable productions that occur naturally in Bootan, the application for purposes of life is confined to timber, fuel, and dyes.* Of the various kinds of timber trees I am quite ignorant; they are used chiefly for rafters, planks, and troughs, either for aqueducts or for mangers. A great part of the planking is derived from fir trees, which are always preferred for fuel. Of the turpentine procurable from their various species of *Pinus* they seem to make no use, so that they are ignorant of one great value of these valuable trees; that of the *Pinus excelsa* is very abundant, and highly fragrant. In the lower ranges the bamboo becomes of almost universal application, and constitutes the greater portion of the huts of the inhabitants of these districts; baskets of various sizes, and implements for clearing the rice from the husk by agitation, &c. are likewise manufactured from it.

* Although the *Bogh Puttur*, or path, is found in abundance on the higher ranges, yet it is not resorted to for furnishing an article of trade. The tree is a species of birch, and the thin flakes of its bark are used in the composition of *hookah* snakes

In similar places rattans are in demand, and several valuable sorts may be procured. They form the fastening of all the bamboo work, are used in some places to secure the roofs from the effects of the violence of the winds, and form a great portion of the baskets in which loads are in this country universally carried. These are very convenient receptacles, forming a rather narrow parallelogram; they are frequently covered with hides, they open at the top, and are the most convenient hill baskets I have hitherto seen.

The Booteas depend on the plains for supplies of betel-nuts, otherwise they might advantageously cultivate the tree on many of the lower ranges. So far as I had an opportunity of judging, they possess few wild palms of any description, excepting rattans; I observed one, which grows on inaccessible places as high as 2000 feet, and which will probably prove new, but I did not succeed in obtaining the specimen requisite for actually determining whether it is so or not. *Ficus elastica*, the caoutchouc tree, occurs about Dewangiri, but not in abundance, and may be expected to occur throughout greater part of the ranges between the Plains and an elevation of 3000 feet. They are aware of the properties of the juice, and use it to make vessels formed from split bamboos, water-proof. The Simool tree likewise occurs within similar elevations, but they make no use of it, although in Assam the cotton is used for the manufacture of a very light and excessively warm cloth, excellently adapted for quilting.

A solitary mango tree occurs here and there in villages even as high as 4000 feet. The finest occurs at Punukka, in the royal gardens, which are emblematic of the poverty and want of horticultural skill in Bootan. It bears its flowers there at a time when the fruit is fully ripe in the Plains.

Jack trees occur every where about the villages on the lower ranges, and is one of the few fruit trees from which they derive any gratification. These trees thrive remarkably well at elevations of 2000 feet, particularly if within the influence of the Plains.

In villages at similar elevations two or three species of fig may be found, but the fruit is not edible; no oranges are cultivated with a view to the market; a few occur in some of the villages; the tree does not occur above 5500 feet, and in such altitudes it requires a sheltered, sunny place. The oranges which we received as presents, all came from the Plains. With the orange, the shaddock also occurs in tolerable frequence.

One of the most common fruit trees is the pomegranate, it does not thrive however above an elevation of 4000 feet: I saw no fruit on

the trees, which were however loaded with flowers; very fine ones occur about Punukka.

They likewise possess peaches, (perhaps the almond) and pear trees: but I am unable to say of what nature the fruit may be; we saw the trees during their flowering season.

The Bheir also occurs at low elevations; and in the gardens of Punukka I observed another species, forming a handsome good sized tree, but like most of the others, it was not bearing fruit. In the same garden there is cultivated a species of *Diospyros* with edible fruit, which also I did not see, and in fact we did not appear to have been in Bootan during the fruit season. The only fruit which we enjoyed were walnuts; we procured these only at Punukka, most of them in presents from the Deb, and a few by purchase, but these were of inferior quality; these walnuts are very good, and would be much better were care taken at the time of gathering. The trees are said to be cultivated in orchards at considerable elevations, but we saw no attempt at any thing of the sort, although we met with a few isolated trees here and there.

On the lower ranges, but scarcely above 3000 feet, the papaw occurs, but so far as I could see did not promise much return. Pine-apples, which occur so profusely on the Khasy hills, and are of so much use to the natives, are very rare in Bootan, as well as in those parts of the Dooars which we crossed.

On our return, we met with a fruit which promised under improved cultivation to be agreeable enough; it was about the size of a pigeon's egg, with a large smooth shining black seed; in flavour it approached somewhat to the Sappadillo, to the natural family of which it would seem to belong. The only ornamental tree to which the Booteas are particularly attached is the weeping cypress: these occur about all the castles and palaces, and especially about religious buildings. It is as ornamental a tree as can be well conceived, and as it thrives between elevations of 5000 to 7000 feet, I was very anxious to obtain seed for introduction into England; but all that I did obtain were bad, and I imagine that the female tree was alone met with. Of the gramineous plants found wild in Bootan no use seems to be made; wherever such plants are in requisition for thatching, the Plains are resorted to, as these, at least under the admirable management of the Bootea government, abound with *Oollookher*, *Kagara*, *Megala*, *Nol*, and *Ikora*. The plants of the hills themselves are chiefly coarse species of *Andropogon*, not serviceable for thatching; among these the lemon grass occurs abundantly. I am not aware whether the natives of these mountains use any plants occurring naturally as *vegetables*, cooked or uncooked; I

never saw any of that scrambling into the jungle on the part of the coolies which so generally occurs in Assam and Burmah, where every second or third plant is a favourite dish.

Of their medicinal plants I am quite ignorant. Our guide, Chillong Soobah, who had a great leaning to the practice of physic, assured me that the Booteas were quite ignorant of any medicine whatever; but this is so contrary to the prevailing practice among barbarous and semi-barbarous nations, that I place no confidence in the assertion.

Of the mineral productions of the country I had no opportunity of learning any thing. The only article of this nature that I saw turned to account was clay for pottery; and this was only met with at Punukka. In short, whatever the resources of the country are, one thing is at least certain, that they have not yet been developed; and I give the greater part of the nation credit for being amongst the most idle and most useless on the face of the globe.

Of the agriculture of Bootan little is to be said, as so very large a proportion of the supplies is derived from the Plains. The state in which the little agriculture is, that is carried on, argues as little in favour of the amount of agricultural skill they possess, as the uncultivated state of the Dooars does in favour of their numerical extent, or of that of their Plain subjects.

Of *Cerealia,* or culmiferous plants, they have the following sorts: rice, wheat, barley, raggy, millet, maize; and of farinaceous grains, not the produce of culmiferous plants, they have buckwheat; and of *Atriplex,* one or two species of the leguminous grains. They cultivate one or two species of *Phaseolus,* one of which is the *Phaseolus,* Max; the Oror, *Cytisus Casan*; the Pea, *Pisum satirun.*

The only oily seeded plant I saw, and of this only fragments, was the *Tel, Sesamum orientale;* I saw no reason however for supposing that they manufactured this oil themselves.

Of the culmiferous plants, rice forms the staple article of food, and is perhaps exclusively used by the chiefs and their adherents, and the very numerous establishments of priests. It is only the staple article viewing the Dooars as forming part of Bootan, for in the interior the proportion borne by this grain to that of either wheat or barley is very small.

Most of the spots available from situation and elevation are cultivated in rice, but in all I saw, judging from the remains of the stubble, the crops must have been small. The cultivation is conducted in the ordinary manner, as is likewise the mode of preparing the slopes for irrigation, or in other words, terracing: as might be expected it is generally a summer crop, and in all places of sufficient elevation, is

made to alternate with winter crops of wheat or barley. The highest elevation at which we saw it cultivated was about Tongsa, to the north of which village there is a slope cultivated with it from an altitude of 5500 feet to one nearly of 7000 feet.

It is principally used boiled in the ordinary manner, and in the preparation of their fermented and spirituous liquors. They do not seem to prepare it for eating in the dry state, as is so generally done by Hindoos. Wheat is perhaps the most common grain cultivated in the interior, yet I saw no instance of the promise of fine crops; it is cultivated as low as 3500 feet, and as high as 9000 feet, but the fields we saw at this elevation were miserably poor, from the effects of the bleakness of the winds. No particular steps are taken to favour its growth, except in the three elevated valleys, where manure is employed from some attention to agriculture being absolutely indispensable. The grain is, I think, of inferior quality; it is principally eaten in the shape of chowpatties, or cakes of heated dough. The flour is ground in mills turned by water, but the meal is badly cleaned.

Barley is nearly of equally extensive cultivation, and I think arrives to somewhat greater perfection than wheat; the cultivation is precisely the same, and probably its application. Two or three sorts occur; of these the finest indisputably is a six-rowed barley, but I am unable to say whether it is identical with the *Hordeum hexastichon*, the bear or bigg of Scotland. This sort occurred in great perfection along the ravine of the Teemboo, especially about Chupcha; it was the only crop, really worthy of the name that we saw in the country.

Of the remaining grains of this nature, Raggy,* *Bobosa* of Assam, is the most common; it is of a very inferior nature, and is only used as a makeshift. Millet and maize are so limited in extent, as not to be worth consideration.

Of the other farinaceous grains, buckwheat is the only one cultivated to any extent; it occurs throughout the greater part of Bootan, but especially about 4000 feet. This grain is either a great favourite with all Hill people, or it is of such easy cultivation as to compensate for its inferiority to some others. The Booteas do not appear to feed their cattle on it, and ours by no means approved of it. It is probably used as a bread corn.

The species of *Atriplex*, and one or two of a nearly allied genus, *Chenopodium*, are scarcely worth notice. They occur in Bootan, as in most other mountainous countries in the East, and are more valuable as affording sorts of spinach than for the grains. Equally unworthy

* *Cleusine Coracana.*

of notice are the leguminous grains of Bootan ; and the few species I saw of the produce appeared to me more probably derived from the Plains than from any labour of their own. The only actual cultivation of such I saw was a small plantation of oror below Benka or Tassgong, and this we were told was more with a view to the produce of lac than dâl ; and of the pea, I saw one flourishing field of small extent between Tumashoo and Oongar.

Of their various other " plants cultivated as vegetables for the table," I am quite as ignorant ; every thing in fact is derived from the Plains. We did not even meet with yams or *kuchoos,* both of which I have seen among other Hill people in great perfection. They are unaware of the value of the potatoe.

Every body has heard of Bootan turnips, but very few have, I imagine, seen them. With the exception of a few we obtained at Dewangiri we saw none, nor when we reached the interior did we ever hear of any. There is no doubt however that excellent turnip seeds have been sent to some from Bootan, but whether from this *bhote ka moolkh* or the far finer one to the westward, I cannot state ; I only state their extreme rarity, so far as the Mission was concerned. Far more common is the *Mola,* or radish, which I suspect Turner mistook for turnips, for one has only to imagine that an actual Bootan radish is a real Bootan turnip, and it is so. The Bootan radishes grow to a large size, but they are very coarse and spongy, and heavy of digestion even to a Hindoo stomach. The cultivation chiefly occurs between 5000 to 7000 feet.

Of plantains they possess a few specimens, which may be seen struggling for existence as high as 3500 feet. I did not even see any of the wild plantain, easily distinguishable from the white powder with which the under surface of the leaves is covered, and its large stature. This is common on the Himalayan range to the eastward, and ascends as high as 5000 feet.

Of that most useful family the Gourd family, I saw no sorts under cultivation. As they depend on the Plains for all that in their opinion makes life tolerable, so do they depend upon their jungles for all flowers to which they may have a fancy, or which may be considered as agreeable for offerings. There is no such thing as a flower garden in the whole parts of the country we saw. The royal gardens at Punukka are scarcely an acre in extent, and stretch along ther iver from the bridge to the village. It was made originally with a view to use, never for ornament, and possesses now neither the one nor the other recommendation, although it has an Assamese gardener: oranges, shaddocks, pomegranates, the mango, jack, bheir, &c. &c. are to be found

in it. The Booteas shew some taste in their selection of wild flowers, which is more than can be said for the natives of Bengal, who approve of such vile things as *Ganda,* and *Champa,* and many other equally strong or equally gaudy productions. With Booteas rhododendrons, especially the scarlet and the white arboreous sorts, are favourites, and I observed formed the greater part of some offerings lying in the presence of the Dhurma.

The only cotton, and it was a miserable specimen, that I saw, I have mentioned as occurring along the Monass; yet we were told that a good deal was cultivated in similar places throughout Bootan. That we saw none is accounted for by the bulk of the population wearing woollen cloths, and by the remainder obtaining their supplies from the Plains. No plants were observed used for making cordage, the ropes used for fixing the loads being either made of twisted rattan, or horse-hair. On emergencies the bearers resort to the jungles, in which some very tenacious creepers may be found; but they appear to prefer the species of *Daphne* for this purpose, as the inhabitants of Upper Assam do the *Ood-dal,* a species of *Sterculia.*

No sugar is cultivated in Bootan; a few solitary specimens occurring about villages being the only specimens we saw. The cane itself is imported from the Plains, as well as ghoor. The same is equally applicable to tobacco, large quantities of which must be consumed, as all the men are great smokers.

They do not appear to me to be great pân eaters; their supplies of this are also derived from that source, which they do not scruple to drain so freely. A few straggling plants of hemp are to be met with amongst most villages at rather low elevations, but I never saw any to an extent sufficient to warrant me in supposing that any use was made of it.

Of plants cultivated for dyeing, I am not aware that any cultivation is carried on. At Phullung, one villager was attempting to rear a few plants of the wild indigo, so much used in Upper Assam, and which I have elsewhere stated is a species of *Ruellia.* Of this plant which appears to abound in colouring material of a deeper, but less brilliant hue than that of indigo, I have not been able to meet with any account that can be depended on. I have seen that in one of the volumes of the Transactions of the Agricultural Society it is mentioned as *Ruellia carnosa:* no good authority for the name is given, and on that of the book itself few, I imagine, will be willing to adopt it.

The most common dye in Bootan is that furnished by the *mungisth,* it appears also to be the favourite colour. As the supply obtained from the jungles is plentiful, no means are resorted too to cultivate it. It

forms one of the few articles of export from the country, and is generally exchanged for dried fish. In Bootan at least two species are used, one of these is Roxburgh's *Rubia mungista*. Of the different species of *Rubia* very little is known, and that little is a good deal confused. From Mr. Royle's account it would appear that the article *Munjeeth* is the produce alone of *Rubia cordifolia* (*R mungistha* Roxb.) The two species used in Bootan are very distinct, and very general constituents of other mountainous floras; one of them has leaves without stalks.

Agriculture being in such a poor state, we need not look for improvement in the implements by which it is carried on. The plough is a lumbering article, on the ordinary Indian principle, and the others are equally bad imitations; but as the Booteas pride themselves on being warriors, they are not inclined to turn their swords into ploughshares, and until this is done no improvement can be expected. Manures, so far as I had opportunities of judging, are chiefly confined to the three great valleys; they consisted chiefly of rotten fir leaves, and appeared to me to be of a very poor description. In these parts ashes of stubble and weeds are likewise spread over the surface, but the greatest portion of labour was expended in pulverising the surface. The natives likewise make use of the accumulation of filth under their houses, which judging from the depth of the layer is not always removed annually. This is excellent manure, and is principally used about the little plots of ground attached to most of the villages.

Of fences they are generally very regardless, or at best, place them where they are of no use. Thus the yards of many of the houses, and in some parts what are called gardens, are surrounded with stone walls; some few rising crops are protected by branches of thorny shrubs, but generally the only defence exists in the shape of a herd-boy, who is regardful only of damage done by his own charge.

In domestic animals they cannot be said to be rich. Chowry tailed cows certainly are not common, and would appear to be kept chiefly by the officers of high rank. As their range is restricted to very high elevations, they must be in Bootan of very limited utility. I only saw one sufficiently close to ascertain what kind of creature it was, and I was much disappointed in finding it an heavy, clumsy-looking animal; the specimen, however, was not a fine one. The only herds seen by the Mission were at elevations of nearly 10,000 feet. The Chowry tails exported to the Plains probably come from Thibet; and judging from those which we saw, they are of very inferior quality. The cattle are used as beasts of burden.

A much finer animal is the *Mithun*; this is the same as the Mithun

of the Mishmees, or the animal so known in those parts to the Assamese by that name, but is very different from the Mithun of the Meekir hills. This animal is not uncommon: the finest we saw were at Dewangiri, and none were seen after leaving Tongsa. Nothing can exceed the appearance of a fine bull; it appears to me intermediate between the buffaloe and the English bull, but the cows have much less of the heavy appearance so characteristic of the buffaloe. Their temper is remarkably fine, and their voices or lowing very peculiar, resembling a good deal some of the cries of the elephant. I am not aware that they are of much use to the natives: the oxen are employed at the plough. As the Booteas do not seem to care for milk, they are probably kept with a view to sacrifice, which is with an Asiatic not unfrequently another word for feasting.

The other breed which they possess, and which we only saw between Punukka and the Plains, assimilates much to the common cattle of Bengal; it is however a much larger and a much finer animal.

Sheep are not very common: the most we saw were rams, which formed a standing part of the russut. The ewes are used by the Kampas as beasts of burden, but I am not aware that they are of any use to the Booteas. Throughout Bootan I only saw two flocks.

Goats are common enough, and appear to be of the ordinary Plain breed. We saw no *Khussies*, at least live ones, unless I except the six shawl goats sent by the former Deb as presents to the Governor General.

All these animals are turned out during the day, either alone, or attended by boys. The cattle are picketted at night either in yards or about the villages: the goats find their own quarters in the ground floors of their owner's houses. Either no fodder at all is given, or they are provided with coarse straw, which evidently requires great effort to be eaten. During the rains their condition is much bettered; in the cold weather it is bad enough, as the looks of the beasts testify.

Pigs of ordinary customs are common enough, and were the only animals I saw slaughtered: they are kept with more care than either ponies or cows. They are generally treated to a wash once a day, consisting of a decoction of herbs, of which the common stinging nettle appears to be a favourite, and radish peelings. Most of the pigs we saw engrossed the tender cares of the women, who certainly paid much more attention to them than they would appear to do to their own children. They have peculiar cries well known by the pigs, who are generally very obedient, particularly if they see the wash-tub; at night they also occupy the ground floors. The ponies of Bootan are sufficiently well known, and are I think much over-estimated. They

are very inferior to the Ghoonts of Simla, in size, strength, and appearance. Like all such creatures they are spirited, and sufficiently headstrong: they understand their duties perfectly, and are orderly enough on a line of march, unless the road is particularly easy. Very few first class ponies are to be found in Bootan, and none are to be obtained except, perhaps, at most exorbitant prices. The Booteas patronise nothing but stallions, the mares being almost exclusively used for breeding or for carrying loads; in such cases they are not led, but follow their leader quietly. Ridden ponies are always led; in difficult ascents they are assisted by pushing up, and in descents they are equally assisted by vigorous pulling at the tail. They form a part of all out of door ceremonials, and are dressed out with gay trappings; their switch tails are then converted into regular cock-tails, and ornamented with chowrys. Three or four ponies were selected as presents to the Mission, but as the hour approached for presenting them, the liberality of the Deb rapidly fell, and one alone was given to the Governor General. This creature never reached the Plains, for after falling twice, once a height of 15 to 20 feet, it expired above Buxa: we heard afterward that it had been very ill for a long time, so that the Deb thought it a capital opportunity of getting rid of him.

The mules are fine, and of much more reasonable price than the ponies: they are chiefly kept for riding, and are mostly of good size.

Both ponies and mules are stabled and provided with litters, not as may be supposed of the cleanest description. Their food varies a good deal; on some rare occasions they partake of Indian corn and wild tares; still better off are those which have participated in some religious ceremonies—for these, the green corn of the poor ryot is not considered too good; generally, however, they are fed on the worm wood, which is so common throughout Bootan below 5500 feet, and which is cut up, and then boiled; and in some places they are fed on the young boiled leaves of an oak, not unlike the celebrated English tree. We saw few in good condition. It is probable enough that the ponies of the Deb and his chief ministers are occasionally treated to paddy husks, as the Deb very graciously sent us a handful or two of this nutritious material, in compliance with our requests for some grain for our ponies. Of grass they are deprived except during the rains, although Doab grass is to be found about Punukka in sufficience to feed six or seven ponies a day.

The ordinary dog appears to have been brought from the Plains, but its pariah qualities are not improved, neither is its condition. Of this, one was so convinced, that he took advantage of our escort, and returned to his native country with us, evidently highly pleased at

his escape, and very grateful to us for our good offices. Many of the better orders keep Tartar dogs: these are large, shaggy, powerful beasts, apparently very fierce, and the most incessant barkers I ever met with; they are always kept chained up. At a white face they appear perfectly furious, but perhaps they rely on the chain. Turner says they are not so bad if one is armed with a bludgeon. Mr. Blake found that in almost every instance their eyes were of different colours.

Of domestic birds, the common fowl is the only one: in many places it reaches considerable perfection; about the capital the breed is as bad as can be imagined. They all appear to be low-bred, and the old birds, especially the cocks, are generally lame from corns. Their crows are most curious, and very unlike those of any other variety I know of; it is of inordinate length, and when once commenced can not be stopped, for fright only changes it to a hasty gobble. The bird, while he is undergoing the process, walks along with neck and tail at full stretch, and with his beak wide open, totally absorbed in the business. No care is taken of the fowls, or at most, they are allowed to stand round when rice is cleared or pounded.

They have no ducks or geese, a want they share with all the mountainous tribes I have seen. A peacock is occasionally to be seen in the castles, and at Tongsa we saw one associated with a tame jacana.

Fine Arts.—The ordinary form of houses in Bootan is that of a rather narrow oblong, disproportionately high, building: the better order are rather irregular in shape. They are built either of slabs of stone, generally unhewn, or of mud well beaten down; the walls in all cases are of considerable thickness, and almost universally slope inwards. They are for oriental houses well provided with windows, and are further furnished with small verandahs, of which the Booteas seem very fond. There is little or no ornamental work about them, with the exception of those infested by priests, in which there is generally a rather ornamental verandah. The roofs throughout the interior are of bad construction; they are formed of loose shingles, merely retained in their places by heavy stones placed on the top of each; this necessarily requires a very small slope, but even small as it is, the whole roof occasionally slips off. In some few places where bamboos are available the roofs are formed by bamboo mats, placed in several layers, and secured either by stones or rattans. In the better order of houses the great perviousness of the roof is compensated for by the imperviousness of the ceiling of the uppermost story, which is well laid down with mud; houses situated near the plains, where proper grasses are obtainable are thatched: (the most common grass is the Oollookher, *Saccharum cylindricum*), such roofs from their slope,

thickness, and projecting eaves are excellent. The generality of houses have a court-yard in front surrounded by a stone or mud wall, the entrance to which is, or has at one time been, furnished with a stout door. Access to the first floor, (for the ground floor is invariably occupied by pigs, goats, &c.,) is gained by a rude sort of stair, intermediate between real stairs and ladders, and rather dangerous: a greater degree of safety is sometimes insured by the presence of a banister. Each story is divided into several apartments, which are generally defective in height; no regularity in their distribution appears to be ever observed; they are not provided with chimneys, and in many instances we found the smoke almost intolerable.

The houses of the poorer orders, situated near the plains, are miserable habitations, but still are better than those in common use in Bengal and Assam, in as much as they are built on muchowns.

The castles and palaces are buildings of a much superior nature; indeed it is said that they are erected by Thibetans or Chinese. They are of immense size, varying a good deal in form, according to the nature of the ground on which they are built, and which is invariably a spur or tongue of land situated between the junction of two streams. If the ground be even, the form chosen seems to be parallelogrammic, but if it be uneven, it has no form at all. They are, particularly in the latter case, ornamented with towers and other defences, either forming part of the building or detached from it.

The national walls and roofs are preserved; the former are of great thickness, pierced in the lower part with narrow, utterly inefficient loop-holes. In the interior there are one or two large court-yards. The first and second stories are the chiefly inhabited ones, the ground floor, however, is not so profaned as in other houses. Most of them are ornamented with a raised square or oblong tower or building, in which* * * * take up their quarters. That of Punukka is the largest and loftiest, consisting of several stories, and several roofs gradually decreasing in size—an obvious imitation, except in the straightness of the roofs, of the Chinese form; it is in part covered with copper, as the Booteas assured us, gilt.

All these large buildings, as well as the summer-houses attached to them, the houses of recluses, or active priests, the resting houses of chiefs, and religious edifices of every kind or description, are white-washed, and most are ornamented with a belt of red ochre, not far from the roof. The residences of the great men, and some of the religious edifices, are distinguished by a folded gilt umbrella stuck on the top, resembling a long narrow bell, rather than that for which it is intended.

* A blank in the M.S.—Eds.

In none do there appear to be any particular accommodations for sleeping, but in each house there is a *cloacus*. One room is set apart for a cook-room, and constitutes the principal inconvenience in a Bootea house; no use is made of the uppermost story for this purpose, as the Booteas consider it sacred; and as they have no chimneys, out of pure reverence they are content to bear smoke in its blackest and most pungent forms. Their fire-places, that is for cooking, are good and powerful; these are likewise used as furnaces for their stills. A good representation is given of them in Turner's Bootan. The flooring of the houses is generally good, of many really excellent; the doors are folding, and the fastenings of the windows of similar construction; the only very deficient part of a good Bootea house exists in the stairs and want of chimneys.

To the castles, stables are appended; but in spite of their being deprived of this copious source of filth and vermin, the deficiency is made up by the number of inhabitants.

Of their religious edifices, some are of picturesque appearance, being ornamented with carved window-frames and verandahs. The most common are the pagodas, which approach in form to the ordinary Boodhistical forms, such, at least, as are universal throughout Burmah. Those of Bootan are, however, vastly inferior in size, form, and construction, and are mostly such as an ordinary Burmese peasant would be ashamed of building. They are built of slabs of unhewn stone, and are not much ornamented, particularly as they are not provided with a red belt. The handsomest and the largest* we saw was that close to Chinjipjee, this was ornamented with small pagodas at each corner, and had the umbrella, which was of curious form, garnished with bells, with the usual long tongues. In the upper portion each face had a nose of portentous dimensions, and two Chinese eyes. I am not aware whether, as in Burmah, they contain images or not, but slabs of inscribed slate are very generally let into their sides.† Appended to these are long walls of poor construction covered with roofs; on each they bear inscriptions, and in some instances paintings situated in recesses. The other forms generally occur as small square buildings; they are either built up over large idols or are empty, but decorated with paintings of gods, much resembling, especially in gaudiness, the common sorts of Hindoo deities; or they contain the peculiar cylinders which contain incantations, and which are constantly, or at

* The name of this, *Chiotackari kocho*.

† The pagodas are always surrounded by poles either of bamboo or fir, to which are attached longitudinally long strips of coarse cotton cloths, entirely covered with inscriptions.

least ought to be, kept in motion by the action of water. In some places where running streams are not obtainable, as in the Soobah's houses, these are revolved by the hand.

There is nothing particular in the construction of their flour mills, which are very small; the pivot is vertically attached at the bottom to an horizontal water wheel, and passing above through two horizontal stones, of which the upper one alone revolves, the flour is hindered from falling off the under stone by the person in attendance.

Of bridges they have two kinds, the suspension and wooden; the latter are, I think, of better construction than the former, although not of equal ingenuity. The finest suspension bridge in Bootan is that across the Monass, below Tassgong, and has a span of about sixty yards. The chains are slight, and the links too long; the masonry by which the chains are supported is massive, and built into tall respectable looking towers. The motion is very considerable. The great fault in this bridge, and in this respect it is inferior to that of Chicka, is that its bottom or platform is not flat, but forms the segment of a circle, and is continuous with the sides, which are made of bamboo matting.

The wooden bridges, which are thrown over all the second class torrents, are solid looking, and impress one with the idea of great strength. Considerable pains are taken in the selection of such spots where the span is less, and where solid abutments either exist, or may be readily made. The supports are large beams placed in pairs, with a cross timber between each, and which pass through the abutments, on which towers are erected for the purpose of giving stability. The beams gradually increase in length from below upwards, so that each projects somewhat beyond that immediately below it. On the upper pair, which form a slightly inclined plane, planks are placed. As the upper beams only project over perhaps one-third of the span, the centre of the bridge is made up of horizontal beams and planks; if quite complete the bridge is covered with a chopper, and provided on either side with a stout open balustrade. Small streams are crossed by planks, or timbers, the upper surface of which is rendered plane. From the consideration of their buildings it would appear that they possess considerable architectural genius;* but we were told that all those of superior construction are built by Thibetans or Chinese; this was certainly the case with the bridge erecting over the Deo Nuddee, not far from Dewangiri. As long as nature supplies rocks of easy and perfect cleav-

* Turner in mentioning their aqueducts draws a comparison between the Booteas and the wonderful ancients; he compares a few wooden troughs, applied end to end, and so badly constructed that one kick would demolish considerable portions, to those masterpieces of master minds which laugh at time.

age, the houses are built of such materials, and these are used perhaps in all cases in the constructions of rank or sacred character. In many places mud is resorted to; the mud is pressed tightly between planks, and then assiduously beaten down by feet and clubs; in this they shew great dexterity, five or six persons, chiefly women beating at once a piece of mud of small dimensions. The mud is beaten down on that which has been previously so treated, so that when they come to any height, there must be considerable danger of falling, particularly as the beaters make most extraordinary antics. When each piece is sufficiently compacted it is allowed to dry. As portions of mud of a parallelogrammic form are thus treated, the house presents lines, which at first lead one to suppose that it is built of blocks of coarse sand-stone. The process is very tedious.

The sculpture they possess would appear to be Chinese: some of the figures were really excellent; the finest we saw were at Dewangiri, especially that of the Dhurma, before which it is considered impossible to sin, and this may be the reason of the natives striving so strenuously to do so. All these figures were well dressed. The few figures of Boodh that I saw were rather rude, in the usual position, and with the usual long fingers and toes. These people certainly have an idea of drawing, and this was very pleasing. To a native of the Plains you may shew a drawing which you have every reason to be pleased with, particularly if you have done it yourself, and he says, "*kya?*" or he mistakes a house for a boat, or a tree for a cow. In Bootan, however, the case is very different; our sketches were recognised immediately, no matter what subjects we intended to represent. They are also ready at comprehending charts. And with regard to their own performances we had opportunities of judgment presented to us by the walls of many houses, which were covered with scrawls; they excel in the representation of animals, particularly when the shape depends upon the will of the artist.

Music enters into most of their ceremonies, and the favourite instrument emits a sound like that of a bassoon. Another favourite instrument is a clarionet, particularly when made from the thigh bone of a man: the sound of this is equal to that of any Bengal musical instrument, and is as disagreeable as it is continuous, the skill of the performer depending entirely upon his length of wind. One of these instruments generally heads every procession of sufficient importance.

At two of our interviews with Soobah we had an opportunity of witnessing the mode of dancing, which was done entirely by women, and as certain qualifications for dancing girls exist to a remarkable extent in Bootan, they are chosen indiscriminately. The dancing merely consists in slow revolutions and evolutions, and outturning of the

hands. They danced to their own music, which consisted of a low monotonous chanting, of a much more pleasing nature that the altissimo screeching so admired in India.

Of their manufacturing skill I saw few or no instances. All the woollen cloths of ordinary quality are imported from Bengal or Thibet; their own manufacture being, it is said, confined to the production of coarse, often striped, blankets, scarcely a foot wide. They make but very little cotton cloth, and the manufacture of this appears to be confined to the villages near the Plains; the article is of poor and coarse quality: all their silks and many other parts of their fine apparel are Chinese.

I have before mentioned the use they make of bamboos, and rattans: in the work of articles manufactured from these materials they are not superior to the wildest of the Hill tribes to be found about Assam.

Their ordinary drinking cups are wooden, and look as if they were turned; and they are perhaps the best specimens of manufacture we witnessed.

Their workers in metal are very inferior; we saw some miserable blacksmiths and silversmiths, provided with utterly inefficient apparatus; however there is not much demand on their skill, as all their arms, and all their better sort of utensils are of foreign manufacture, principally Thibetan. They are said to manufacture the copper pans used for cooking or dyeing, and which are frequently of very large dimensions; and they went so far as to point out the place of manufacture, viz. Tassangsee. But I doubt this, for in the first place the vessels resemble much those made in Thibet; and in the second, I saw nothing like any manufacture going on at Tassangsee, except that of burning charcoal, which is much used in cooking. Paper they certainly do make, and in some quantity: I had no opportunity of seeing the process. The material is furnished by two or three species of *Daphne*. The article varies much in size, shape, and quantity; the finest being white, clean, and very thin; the worst nearly as coarse as brown paper. If bought from the manufacturers themselves it is cheap, the price being six annas for twenty large sheets; if from an agent the price of course increases in a centesimal proportion. It is well adapted for packing, as insects will not come near it, always excepting the formidable white ant, who however consumes the contents of the paper, not the article itself. This paper appears to be precisely the same as that manufactured to the north-west and south-east by the Shan Chinese.

The only potteries, I saw were near Punukka, but although they supplied the capital, there were only two or three families employed. The clay is obtained close to the potteries, and is of tolerable quality;

it is pulverised by thrashing with a flat club, and is then sifted. It is subsequently kneaded by means of water into the proper consistence. The operations are conducted entirely by the hand, and the dexterity which is shewn in fashioning the vessels is considerable. Of vessels for containing water the upper half is made first, and the under is added afterwards. Those made during the day are burnt at night, being covered with straw, which is then set on fire; the finishing operation, if required, and which is intended as a substitute for glazing, is rubbing them over with tarry turpentine; they are then packed and carried off to market, or rather to the palace: the artists are the poorest of the poor, and as filthy as any other class in Bootan. They live close to the potteries, in the most miserable hovels imaginable. The wares they furnish are of several sorts—dishes, and pans, (some of which have very small inefficient handles) gurrahs, and large oblong vessels for containing water; of these one family consisting of ten or twelve can make a considerable number, say sixty in one day.

Of their manufactures of leathern articles I can say nothing: the only articles I saw of this nature were the boots, which are of untanned hides, and the reticules for holding tobacco, which are of decent fashioning, tanned and coloured. And I believe I may here close the list, meagre as it is, for the sugar, oil, ghee, &c. they use, is all brought up from the Plains. As their manufactures are at so low an ebb, not much is to be expected in the way of commerce; and this must continue to be the case so long as they derive every thing from the Plains, and make no returns whatever; so long as they may live an idle life at the expense of others. Throughout the country indeed there is but little evidence of frequency of intercourse. The busiest place by far was Dewangiri, but this depended chiefly on the steps taken for the provision of our party, and on the daily assembling of the Kampas prior to descending to Hazoo. The Deb is stated to be the principal merchant, but we only met two coolies laden with his merchandise! All the Soobahs likewise trade, but I apprehend their dealings are altogether insignificant; for excepting their followers, who are disinclined to pay, even had they money, and the priests who will not pay, I know none from whom advantage in the way of traffic could with any reason be expected.

The exports from Bootan to the Plains are generally exposed for sale at annual fairs, of which Hazoo and Rungpore are the principal. The articles are ponies, mules, woollen cloth, and rock salt. To these I must add a peculiar spice, known in Assam by the name of *Jubrung*, and which is used, I believe, to some extent by the natives in their cookery. It is very fragrant, very aromatic, and excessively pungent, and if kept in the mouth but a short time, occasions a

remarkably tremulous sensation of the tongue and lips. It is the capsule of a species of *Zanthoxylon* found on other mountains to the north-east, although I am not aware whether it is used as a spice elsewhere than in Bootan. Captain Jenkins first pointed it out to me, and I had several opportunities of seeing the shrub producing it during my visit to Bootan. All these are of inferior quality, scarcely less so, perhaps, than the article in which they pay the greater part of even their nominal tribute. From Thibet they obtain all their silks and tea, there is, however, very little intercourse between the countries.

I am afraid that this very imperfect account will be considered as prejudiced; but I believe it will be found, if put to the test, tolerably faithful. I went into the country prepossessed in favour of every thing bearing the name of Bootan—I expected to see a rich country, and a civilized people. I need not say how all my expectations were disappointed. Whatever ulterior benefits may be derived from the Mission, one, and that by no means inconsiderable, has already resulted—I allude to the demolition of the extravagant ideas entertained, even by our frontier officers, of the prowess and riches of Bootan. As the Mission will have been the means of reducing this people to their proper level among barbarous tribes, we may expect their demeanour will become more respectful, their behaviour more cautious, and the payment of the tribute more sound and more punctual. In a word, they will understand that they are tolerated by—not the equals of—the gigantic British power. I have stated my opinion of them with some severity, but with impartiality; and my conviction is, that they are in all the higher attributes very inferior to any other mountainous tribe I am acquainted with on the north-east frontier.

It must not be supposed that, however disgusted with the inhabitants of the country, the Mission was not a source of great gratification to me. It afforded me an opportunity of visiting a very alpine country; and, what is much more important, of fixing, through the kindness and skill of Captain Pemberton, the localities of nearly 1500 species of plants with such accuracy, that the collection will be of much interest to all students of botanical geography. It afforded me too an opportunity of profiting from the valuable instructions of Captain Pemberton; so much so, that it will always be a matter of regret to me that I was so ignorant of so many essential requisites during the other journeys I have had the honour of performing.

WILLIAM GRIFFITH,

Asst. Surg. Madras Est. in Med. charge Bootan Mission.

ART. II.—*Account of Tamba Patra Plates dug up at Baroda in Goojrat; with Facsimile and Translation.*

(Laid before the Meeting of the Asiatic Society of 5th June, 1839.)

The Tamba Patras now submitted to the inspection of the members of this Society were placed in my hands by Mr. W. P. GRANT, who obtained them from BENI RAM, of *Baroda*, and whose account of the method of their discovery as derived from that person, was, that they were dug up in excavating the foundations of a house in that city.

The grant is peculiar in many respects. It is in a character not exactly corresponding with any previously observed, but sufficiently similar to that of the grants decyphered by Mr. WATHEN to be easily made out by persons accustomed to the work, after a little study and comparison. The pandits and antiquaries of *Baroda*, indeed, were baffled in their attempts to make out the character, and the plates were put into my hands as undecypherable; but KAMLAKANTA, the pandit who assisted our late Secretary in his discoveries, undertook the task of reading them with confidence, and accomplished the complete transcription into Devanâgrí in about a fortnight. The plates are submitted to inspection with a transcript, fac-simile, and close translation, the latter made by SÁRODA PARSHAD CHAKRAVARTI.

They are found to be the record of a deed of grant made by KARKA' Raja of *Lâtéshwara* to BHA'NU BRAHMIN, son of SA'MADITYA, in the year of Saka 734, corresponding with 812 A.D., that is, just one thousand and twenty-seven years ago. Their state of preservation is wonderful for such a period, but that may be owing partly to the purity of the copper, and partly to the care with which the edges have been beaten up so as to take all the friction, and prevent the faces of the plates from rubbing against one another. Their present appearance is owing to an acid having been used to clean them.

Although uniformly clean and bright, the marks of corrosion will be observed in several places, which are the effect of antiquity; but fortunately the letters are so deeply engraved that scarcely any are completely effaced.

The historical facts deducible from this Tamba Patra are the following:—

First, That towards the end of the 8th and beginning of the 9th century of our era, that is during the reign of CHARLEMAGNE of France, Hindoostan and the Dukhun were divided into four kingdoms:—The *Gajara* Raj westward—the *Malwa* Raj centrical—to the east the *Gourha* Raj, (including *Bengal* and *Behar*)—and the *Lâtéshwara* Raj

to the south; of which last the reigning Raja in 812 A.D. was KARKA' Raja, the maker of this grant.

Secondly, That in the *Lâtéshwara* Raj the following kings, ancestors of KARKA' Raja, had successively reigned:—

1. GOVIND Raja.
2. KARKA, Raja, his son.
3. KRISHNA Raja, his son.
4. DHRUVA Raja his son, who obtained the beatitude of dying at Allahabad where the waters of Jamna and Ganga unite.
5. GOVINDA Raja II, son of Dhruva.
6. INDRA Raja, brother of Govinda.
7. KARKA, Raja II, son of Indra Raja.

Thirdly, It further appears that in 812 A.D. KARKA Raja had no son; but his brother DANTI VARMA signs as heir presumptive.

Fourthly, The capital of the *Lâtéshwara* Raj appears to have been *Elapúr*, where a magnificent fort and temple of Siva are stated to have been erected by the third of the above race—the KRISHNA Raja.

It remains to identify this dynasty. Of all the lists of Rajas and races collected in the late Secretary's useful tables, the one, and indeed the only one, which contains names corresponding with those found in the present grant is that given in Table XLIV. page 121, headed "Rajas of Chera or Konga," (comprehending *Salem* and *Coimbatore*) and stated to be taken from the late Colonel Mackenzie's manuscript collections.

Amongst the twenty-six princes of that dynasty, taken from the *Kongadesa Raja Kal*,* all the names of our list are found except that of INDRA Raja, the father of KARKA Raja II. This latter name, KARKA, I take to be identical with that of KONGANI, which occurs thrice amongst the twenty-six. The period assigned inthe useful tables for the Rajas of *Kongadês* corresponds exactly with the date of our grant; nevertheless I do not feel quite satisfied with the evidence to the identity of *Lâtéshwara* with the Kongadês, and I should wish the attention of the learned and curious to be directed to the determination of this point, and to the ascertainment of the locality of the famous fort of *Elapúr*.

H. T. P.

* The notice of this work will be found in page 198 of Professor WILSON's printed account of the collection of Col. MACKENZIE's manuscripts, and again in the Rev. Mr. TAYLOR's more recent examination of the manuscripts at Madras. There are, it appears, two copies of the work in Tamul on Palm leaves, from which Mr. TAYLOR has had a copy transcribed on paper, and deeming the work valuable, he has translated it.

स वो ऽव्याद्दचसामीशो यन्नाभिकमलाश्रितः ।
हरश्च यस्य कान्तेन्दुकलया समलङ्कृतः ॥१॥

स्वस्ति स्वकीयान्वयवंशकर्त्ता श्रीराष्ट्रभूपामलवंशजन्मा ।
प्रयाणशूरः समरैकवीरो गोविन्दराजः क्षितिपो वभूव ॥२॥

यस्याच्छिमाचजयिनः प्रियसाहसस्य
क्ष्मापालवंशदहनमेववभूव सैन्यं ।
मत्वा च शङ्करमधीश्वरमीश्वराणां
नावन्दतान्यममरेष्वपि यो मनस्वी ॥३॥

पुत्रीयतश्च खलु तस्य भवप्रसादात्
सूनुर्बभूव गुणराशिरुदारकीर्त्तिः ।
यो गौणनामपरिवारमुवाह मुख्यं
श्रीकर्कराजसुभगव्यपदेशमुच्चैः ॥४॥

सौराज्यजल्पये पतिते प्रसङ्गान्निदर्शनं विश्वजनैकसम्पत् ।
राज्यं कुलैः पूर्वमहो बभूव क्षितावितीदानीन्तु नृपस्य यस्य ॥५॥

अत्यद्भुतंचेदममंस्त लोकः कलिप्रभावेण यमेकपादं ।
जातं वृषं यः कृतवानिदानीं भूयश्चतुष्पादमविघ्नचारं ॥६॥

विष्णौ जगत्त्राणपरे मनस्थे तस्योचिते तन्मयमानसस्य ।
धर्म्मात्मनस्तस्य नृपस्य जज्ञे सुतः सधर्म्मा खलु कृष्णराजः ॥७॥

यो वंश्यमुन्मूल्य विमार्गभाजं राज्यं स्वयं गोत्रहिताय चक्रे ।
ब्रह्मण्यभा तस्य च कापि साभूद्विप्राय या केवलजातयोऽपि ॥८॥

श्रेष्ठद्विजन्मोचितदानलुब्धाः कर्म्माण्यनुष्ठानकृतानि चक्रुः ।
इक्षातिरेकेन कृषीवलानां पयो यथा मुञ्चति जातु मेघे ॥
भवेन्मनस्तद्विरतौ तथाभूद्यस्मिन् धनं वर्षनि सेवकानां ॥९॥

यो युद्धकण्डूतिगृहीतमुच्चैः सौर्य्यौष्मसंदीपितचापदन्तं ।
महावराहं हरिणीचकार प्राज्यप्रभावः खलुराजसिंहः ॥१०॥

एलापुराचलगताङ्गतसन्निवेशं
यद्वीक्ष्य विस्मितविमानचरामरेन्द्राः ।
एतत् स्वयम्भुशिववामनकृत्तिमेश्री
र्दृष्टेदृशीति सततं बक्र चर्च्चयन्ति ॥११॥

भूयस्तथाविधकृतौ व्यवसायहाने
रेतन्मया कथमहो कृतमित्यकस्मात् ।
कर्त्तापि यस्य खलु विस्मयमाप शिल्पी
तन्नामकीर्त्तनमकार्य्यत येन राज्ञा ॥१२॥

गङ्गाप्रवाहहिमदीधितिकालकूटै
रत्यङ्गताभरणकैः कृतमण्डनोऽपि ।
माणिक्यकाञ्चनपुरःसरसर्व्वभूत्या
तत्र स्थितः स्वयमभूष्यत येन शम्भुः ॥१३॥

नृपस्य तस्य ध्रुवराजनामा महानुभावस्तनयो बभूव।
तृणीकृतान्यस्य पराक्रमेण प्रतापवह्निर्द्विषतो ददाह ॥१४॥

लक्ष्मीप्रसाधनविधावुपयोगिकृत्यं
यच्चिन्तयन् स्वयमभूदनिशं कृतार्थः ।
किञ्चात्र चित्रमनपेक्ष्यसहायमीशः
सर्व्वःपुमान्निजबधूं स्ववशां विधातुं ॥१५॥

यो गङ्गायमुने तरङ्गसुभगे गृह्णन् परेभ्यः समं
साक्षाच्चिह्ननिभेन चोत्तमपदं यः प्राप्तवानैश्वरं ।
दृहासम्मितवैभवैरिव गुणैर्यस्य भ्रमद्भिर्द्दिशो
व्याप्तास्तस्य बभूव कीर्त्तिपुरुषो गोविन्दराजःसुतः ॥१६॥

प्रदेशवृत्तिव्यवसायभाजां पुरातनानामपि पार्थिवानां ।
यशांसि यो नाम जहार भूयो भग्नप्रचण्डाखिलवैरिवीरः ॥१७॥

उन्मूलितोत्तुङ्गनरेन्द्र वंशो
महानरेन्द्रीकृततुङ्गतुल्यः ।
स्वेच्छाविधायी चरितानुकारं
चकार यो नाम विधेः क्षितीशः ॥१८॥

हिङ्गीरशिच्चितरणोच्चरणानरातीन्
कुर्वन् क्षणेन विदधेऽद्भुतकर्म्म यश्च ।
चक्रे तथाहि न तथाम्बु वधं परेषां
पार्थोऽपि नाम भुवनत्रितयैकवीरः ॥१९॥

कल्पक्षयक्षणसमुद्भववातहेला
दोलायमानकुलशैलकुलानुकारं ।
यन्मुक्तचण्डशरजालजवप्रपन्ना
युद्धागतारिपुगजेन्द्रघटा चकार ॥२०॥

भ्राता तु तस्येन्द्रससानवीर्य्यः श्रीमान् भुवि क्षमापतिरिन्द्रराजः ।
शास्ता बभूवाद्भुतकीर्त्तिसूतिस्तदा तु लाटेश्वरमण्डलस्य ॥२१॥

अद्यापि यस्य सुरकिन्नरसिद्धसाध्य
विद्याधराधिपतयो गुणपक्षपातात् ।
गायन्ति कुन्दकुसुमस्मियशोयधास्व
धामस्थिता सहचरीकुचदत्तहस्ताः ॥२२॥

येनैकेन च गुर्ज्जरेश्वरपतिर्यो द्धुं समभ्युद्यतः
शौर्यप्रोद्धतकन्धरो मृग ईव क्षिप्रं दिशो याहितः ।
भीतासंहतदक्षिणापथमहासामन्तचक्रायते
रक्षामापविलुप्यमानविभवं श्रीवल्लभेनादरात् ॥२३॥

तस्यात्मजः प्रथितविक्रमवैरिवर्ग
लक्ष्मीहरोहरपदाम्बुजलग्नचित्तः ।
श्रीकर्कराज्यपरिपालनसर्व्वरीशः
शास्त्रार्थबोधपरिपालितसर्व्वलोकः ॥२४॥

राज्ये यस्य न तस्करस्य वसतिर्व्याधेः प्रसूतिर्मृता
दुर्भिक्षं नच विभ्रमस्य महिमा नैवोपसर्गोद्भवः ।
क्षीणो दोषगणः प्रतापविनताश्चैवारिवर्गास्तथा
नो विद्वत्परिपन्थिनी प्रभवति क्रूरा खलानां मतिः ॥२५॥

गौडेन्द्रवंशपतिनिर्जयदुर्व्विदग्ध
सद्गुर्ज्जरेश्वरदिगर्गलताञ्च यस्य ।
नीत्वा भुजं विहतमालवरक्षणार्थं
स्वामी तथान्यमपि राज्यफलानि भुंक्ते ॥२६॥

तेनेदं विद्युच्चञ्चलमालोक्य शाश्वतं क्षितिदानं परमपुण्यं प्रवर्त्तितोऽयंधर्म्मदायः। सच लाटेश्वरसमधिगताशेषमहाशिष्टमहासामन्ताधिपतिसुवर्णवर्षश्रीकर्कराजदेवो यथासम्वेध्यमानकान। राष्ट्रपतिविषयपतियामकूलाधिकारिकमहत्तरादीन् समनुबोधयत्यस्तुवः संविदितं यथामया सिद्धशर्म्मसमावासितेन मातापित्रोरात्मनश्चैहिकामुष्मिकपुण्ययशोभिवृद्धये श्रीवलभीविनिर्गततच्चातुर्व्विद्यसामान्यवात्स्यायनसगोत्रमाध्यन्दिनसब्रह्मचारिब्राह्मणभानवेभट्टसोमादित्य

पुत्राया ङ्कोट्टकचतुरशीत्यन्तर्गतपद्रकाभिधानग्रामैर्य्यस्याघाटनानि पूर्व्वतो जम्बुवाविकायामस्तथा दक्षिणतो महासनकाख्यतङ्गागं तथा पश्चिमतोऽ ङ्कोट्टनं तथोत्तरतो वग्धाछ्यग्राम एवमसौ चतुराघाटनो पलक्षितः सपरिकरः सभूतवातप्रत्यायः सदण्डदशापराधः सोत्पद्यमानविष्टिकः सधान्यहिरण्योदयः सर्वराजकीयानाम हस्तप्रक्षेपणो यः स चन्द्रार्काणर्वसरित्पर्व्वतसमकालीनः पुत्रपौत्रान्वयभोग्यः पूर्व्वप्रदत्तदेवदायब्रह्मदायरहितो भूमिच्छिद्रन्यायेन शकनृपकालातीतसंवत्सरशतेषु सप्तसु चतुस्त्रिंशदधिकेषु महा वैशाखस्य द्वादशदिवसे बलिचरुवैश्वदेवाग्निहोत्रातिथिपञ्च महायज्ञक्रतुक्रियाद्यत्सर्पणार्थं प्रतिपादितः। यतो ऽस्योचितया ब्रह्मदायस्थित्या भुञ्जतो भोजयतः प्रतिदिशतो वा क्षमतः कर्षयञ्च न केनचित् प्रतिबन्धना कार्य्या तद्भोगार्थिभिरस्मद्वंश्यैरन्यैश्च सामान्यभूमिदानमवगछद्भिर्विद्युल्लोलान्यनित्यान्यैश्वर्य्याणितृणाग्रलग्नजलविन्दुचञ्चलञ्च जीवितमाकलय्य स्वदायनिर्व्विशेषोऽयमस्मद्दायोऽनुमन्तव्यः पालितव्यश्च। यश्चाज्ञानतिमिरपटलावृतमतिराच्छिन्द्या दाच्छिद्यमानञ्चानुमोदते। स पञ्चभिर्महापातकैः सोपपातकैश्च युक्तः स्यादित्युक्तञ्च । भगवतावेदव्यासेन। श्लोकौ

विन्ध्याटवीष्वतोयासु शुष्ककोटरवासिनः।
क्षुण्णाहयो हि जायन्ते भूमिदायापहारिणः॥

अग्नेरपत्यं प्रथमं सुवर्णं भूर्वैष्णवी सूर्य्यसुताश्च गावः।
लोकत्रयं तेन भवेच्च दत्तं यः काञ्चनं गाञ्च महीञ्च दद्यात् ॥

बह्वभिर्वसुधा भुक्ता राजभिः सगरादिभिः।
यस्य यस्य यदा भूमिस्तस्य तस्य तदा फलं ॥

यानीह दत्तानि पुरानरेन्द्रैर्दानानि धर्म्मार्थयशस्कराणि ।
निर्म्माल्यवान्तप्रतिमानि तानि को नाम साधुः पुनरादद्दीत ॥

स्वदत्तां परदत्तां वा यत्नाद्रक्ष नराधिप ।
महीं महीभृतां श्रेष्ठ दानाच्छ्रेयोऽनुपालनं ॥

इतिकमलदलाम्बुलोलां श्रियमनुचिन्त्य मनुष्यजीवितञ्च ।
अतिविमलमनोभि रात्मनीनैर्नहि पुरुषैः परकीर्त्तयो विलोप्याः ॥

उक्तञ्च भगवता रामभद्रेण ॥ सर्वानेतान् भाविनः पार्थिवेन्द्रान भूयो भूयो याचते रामभद्रः । सामान्योऽयं धर्म्मसेतुर्नृपाणां कालेकालेपालनीयो भवद्भिः । द्रुतकञ्चाच राजपुत्रश्रीदन्तिवर्म्मा । स्वहस्तो मम श्रीकर्करराजस्य श्रीमदिन्द्रराजसुतस्य ॥ लिखितश्चैतन्मया महासन्धिविग्रहाधिकृतकुलपुत्रकदुर्गभटसूनुना नेमादित्येनेति ॥ अयञ्च ग्रामोऽतीतनरपतिपरीक्षिणानटकश्रीचातुर्विद्याय प्रदत्तो गुणिनेऽपि कुलजजातिविलोपाविच्छिन्नपरिभोगं चौचित्यं श्रीधरामान्यस्य धीविशिष्टञ्चम्यभिज्ञच तुद्विजनेनइतिताम्र पुविन्नोषषापमान परिभोगनुतपानुजानुमोदितः लालाताप्ययन्थेभ्यो लालाचतापूलप्रदानपूर्व्वकालपा एतच्च पतिजाष्ठादत्त प्रकृति कविपिष्टस्य ताज्य श्रीपरमापिता पदा मूलं जानातीति ॥

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Translation of Tamba Patra Plates.

1. May he in whose lily-like navel Brahmá took his abode, and with whose wife's brother (i. e. the moon) Siva is ornamented, protect you.

2. There was a Rája named Govinda Rája who was the superior of his race, and the ornament of the *Surastra* kingdom; he was sprung from a spotless line, a hero in enterprize, and most valiant in war.

3. He (Govinda Rája) was most gallant, intelligent, and victorious at his first glance over all. His armies were like ploughs rooting up the royal families (of his enemies). He never adored other gods but Siva, the god of gods.

4. From him, anxious to obtain children, was born through the favor of Siva, Karka Rája, who was possessed of all good qualities. The name was well adapted to him.

5. His (Karka Rája's) kingdom, (which lost the appellation *Sowrájya* through the ruin that had fallen upon it, but the remains of the splendour of which are esteemed by the universe) was formerly governed jointly by the descendants of this race, but afterwards by him alone.

6. Men were struck with surprise by his restoring the *Vrísha* to its four legs, which had been reduced to one by Kali' (yúga), and by his making it to walk without limping.*

7. It is not wonderful that he governed his people with propriety, (being so gifted); having placed Vishnú as the object of his meditation, he (died and) was succeeded by his son named Krishna Rája, who was virtuous, and like the son of Dharma (Ju'dhisthi'ra): he expelled those who were addicted to evil, for the prosperity of his line and reign.

8. His devotion to Bráhmans was unspeakable and confirmed, and those who were only nominally Bráhmans (i. e. who had fallen off from their religion) resumed their former rites through the greedy desire of obtaining gifts from him, which were due to more perfect Bráhmans.

9. By his constant liberality the minds of his attendants were refreshed like those of farmers by exuberant showers.

10 He who was like a lion among Rájas, and powerful in sovereignty, overcame his boar-like rivals like deers; though their teeth, curved like bows, were radiant with the rays of heroism, and they itched with the desire of fight.

11 The immortals walking on the firmament, being astonished with

* This is a figurative mode of saying "That he restored to virtue the three parts which it is supposed to have lost in the Kali yúga," the word for quarter पाद being the same as for foot, makes the conceit which gives point to this expression.

the view of his fort of *Elapúr*, declared continually that the beauty of that fort was no where to be found but in the works of Swayambhú, Siva, and Bámana.

12. The architect of it was himself struck with wonder at its beauty. His name has been proclaimed every where by the king himself.

13. The image of Sambhu' (Siva) established therein, though wonderfully ornamented with the symbols of Gangá, the crescent and the kálakúta (a kind of poison), yet was further adorned with ornaments of gold and jewels, and several other materials.

14. His (Krishna Rája's) son was Dhru'va Rája: his enemies, who were humbled by his might, were burnt by the fire of his spirit.

15. He was successful in his endeavours to bring Lakshmi to submission, how wonderful!! for even Siva, though lord of all, was unable to make his wife obedient to him without resuming his godhead.

16. From Dhru'va Rája, who established peace with all his enemies, and who attained the final and the highest rank of gods (dying) at the junction of the waters of *Gangá* and *Yamúná*, immersed in them with remarkable signs, and whose merits covered the universe, was born Govinda Rája, who was famous.

17. He deprived all the kings of antiquity who had their communication with different countries of their fame, and destroyed all his enemies.

18. He was in all circumstances irresponsible, and resembled the *Creator* in his conduct, destroying all rival claimants to royalty in his time, and setting them at defiance.

19. He did such wonders in battle, that his foes acknowledged that they had been taught by men ignorant of military affairs. He was like Pa'rtha, the only hero in the three regions who never deprived his enemies of their lives.

20. The elephants of his enemies which came forward in battle and were pierced with his shafts, resembled the wall mountain of the world shaken by the winds at the end of *kalpa* (during the deluge.)

21. His brother Indra Raja, a king powerful like Indra, governed the kingdom of *Lâteshwara*. He performed many wonderful deeds.

22. To this day, the Gods, Kennaras, Síddhas, Sáddhyas, and the Vidyádharas, who have heard of his qualities, are singing his *kunda*-flower-like fame, lost to all sense of shame in their transports, and putting their hands on the breasts of other's females, (i. e. they are so deeply engaged in song that they have become out of sense.)

23. He soon reduced the king of *Gujjara*, who prepared to engage in war with him, and who raised his head with bravery, to fly skulking like a deer, and after plundering all his estates restored him again, out

of compassion, saving his chieftains from ruin who were afraid of (him) and scattered in different places.

24. His (INDRA Rája's) son was the LAKHSMI enticer, whose mind was devoted to the lily-feet of HARA (Siva), and whose spirit was felt by his enemies, like the moon in disposition—KARKA Rája who preserved mankind.

25. There was no robber in his kingdom, nor any sort of mortification, nor famine, nor fear, accidental or natural. All kinds of vice were reduced to a low ebb, and his enemies were humbled; none had the presumption to show disrespect to those who were learned.

26. The owner of *Málava*, in order to defend his kingdom from the invasion of the king of *Gourha* (Bengal) used the (uplifted) hand of KARKA Rája as a stay on the lord of *Gujjara*, and thereby enjoyed all he desired.

27. He having considered life to be fickle as the lightning, and the virtue of giving land durable, executed this religious gift.

28. He, the king of *Lâteshwara*, possessed of armies and many chieftains, brought into submission in different countries, and in whose reign there was a shower of gold, thus proclaims to all his statesmen, the treasurers, the functionaries, and those who have the care of castes, with the respect due to them.

Be it known to all of you, that for promoting the virtue and fame both here, and in the next world, of his father, and mother, and himself, he, the said Rája, has presented for continuing his five *jagnas* to the Bráhman BHA'NU', who belonged to the line of VA'TSA'YANA, and was acquainted with the four *Vidyás*, and who was a religious student, the son of SOMA'DITYA, the fertile village called PATTANAK, part of the tract containing eighty-four *angkotans* (each 100 begas) bounded on the east by the village of *Jambúbábiká*, on the south by *Mahá Sanaka*, on the west by a *nala (ankootaka)*, and on the north by the village *Bagghachha*. The land within the above boundaries is to be enjoyed with all marriage and other fees from cultivators, with all fishing and fruit privileges, with all that may be washed or deposited by torrents, with all fines for petty offences, with all free labour privileges, with all rights of treasure-trove and mines, without interference of any kind from government officers. It is to be enjoyed in full property as a perpetual inheritance by the said Bráhman, his sons, and posterity for ever, so long as the sun, moon, and rivers, and the mountains shall endure! It is not to be touched by the hands of the king's servants, nor to be claimed on the part of gods and Bráhmans, by whom it was heretofore possessed. Given in the year of Saka's death 734 on the 12th of Bysakh (24th April, 822 A.D.)

॥संवत् १८५५ वर्षे ज्ये० सा० सुक्ल ७ रविवारे॥
जयतिजगतिकीर्टा श्रीस्वरोदयसिंहः पर तु
प्राणभाजांतेनगुं जातिनाशिलिखि
यथावच्चेजनाथस्यजनाजातिसि-
द्धिसिद्धयर्थं यत्र यत्र स्थि
ता स्थि स्थ
स्थ॥

๑๕
๑๔
๑๓
๑๒

Let none obstruct his (Bha'nu's) enjoying, or letting others enjoy it; or his ploughing, or letting others plough. After this, let future Rájas of our race, or of any other race, reflect that wealth and life are unstable as lightning, and fickle as water in the leaf of water lilies, and so let them respect this our grant, and confirm the grantees in possession. He only whose mind is blackened by the darkness of ignorance will resume, or be pleased at seeing others molest its possessor, reckless of the guilt of the five deadly sins and other heinous crimes, as described at length by Ve'davya'sa.

He who grants lands lives 60,000 years in heaven, but he who confiscates or resumes, or allows others to do so, is doomed to hell for a like period.

Those who resume lands granted by others will become black serpents in the dry holes of the forest of the *Vindhya* mountain.

Gold is the first offspring of fire, and the earth the wife of Vishnu, and cows are the daughters of the sun. He who grants these things gives also the three regions.

The earth has been enjoyed by many kings, as the Sa'gara Rája and others, and he who rules it in his turn, is the sole enjoyer of its fruits.

But what generous man will take again the grants made by Rájas who have gone before him, and whose gifts are like wreaths of flowers, spreading the fragrance of a good name, and of the reputation for wealth and virtue.

Oh ye virtuous kings, respect the grants of lands (given by others), for to preserve their grants is better than a fresh donation.

Men whose minds are cleared from sin, considering life and wealth fickle as water in the leaf of the water lily, will never destroy the fame of others.

It is further said by Ra'm Bhadra—You who are the best of Rájas, are hereby repeatedly prayed by Ra'm Chandra to preserve this bridge of virtue for ever.

Confirmed by the counter-signature of the presumptive heir and brother of the king, Danti Varma, and signed with the autograph of myself the Karka Rája, son of Indra Rája, and prepared and engrossed by the hereditary servant of the king for peace and war, Nunaditya, son of Durga Bhatta. For the good of my father and his ancestors have I made this grant to the Bráhman Bha'nu', who has served my family with his prayers for many years. May he enjoy the grant, and profit by it!

N.B. There are several counter-signatures, apparently autographs, in the last four lines of the last plate, which besides that they are of doubtful reading, it would be of little interest to transcribe. On the outside are the words "'Tis for the good of my father and mother."

ART. III.—*Collection of Facts which may be useful for the comprehension of* ALEXANDER THE GREAT'S *exploits on the Western Banks of the Indus (with map).*

By M. A. COURT, *Ancien Eleve de l'Ecole Militaire de Saint Cyr.*

(Translated for the Journal of the Asiatic Society from the French Original M.S.)

The military achievements of Alexander in the regions which lie between the Indus and the Cophenes form one of the most brilliant episodes of his history.

Those regions at present are known by the name of Yousoufzeïs, Kooner, Suwat, Dhyr, Bajore, and Moumends. More northward lies Kaffristan, which occupies the southern and northern sides of the gigantic snow-topped chain of mountains which bounds this country to the north, and is but an extension of the Himalayas, and to the west reaches Hindo-Koosh at the Khound, an enormous ridge, the tops of which are flat, and almost perpetually covered with snow, a circumstance which renders it observable at a great distance: there are likewise visible the banks of the Indus, from which it is about eighty koss distant.

Those regions are bounded on the east by the Indus, on the south by the river of Cabul, which is no other but the Cophes or Cophenes of the Greeks, placed by Arrian at the eastern extremity of Paropamis, and the source of which Pliny collocates in the north western part of this mountainous province, assigning its course eastward, and stating that after its confluence with the Choes near Nyssa, it falls into the Indus to the south west of Taxila below Ambolima (probably *Amb*)—data that perfectly combine with the Cabul river, which I have described in my journey through Affghanistan. This name Cophes, by which it was known to the historiographers of antiquity, seems to have been given it by the Greeks, who may have derived it from *Cophenes* who perhaps then governed the country it washes in the name of his father Artabazus, whom Alexander had appointed prefect of Bactria. This is at least what induced Arrian to adopt the above opinion, who relates that Alexander was accompanied, on his arrival at the banks of the Indus, by Cophes and Assagetes, ὑπαρχοὶ or *sub-rulers* of the province situated to the west of that river. Or perhaps it is the name which it originally bore, and from a corruption of which the Mahometans formed the word *Kaffristan.*

This vast extent of mountainous country is very little known to Europeans. The geographical details which Quintus Curtius gives of it are too succinct, and it is a matter of much regret, that the veracious

Arrian has been incomparably dry, when treating this subject. Add to this the disastrous conquests of the Mahometans, who spread throughout trouble and confusion, besides the custom that prevailed, wherever the Greeks of Alexander's army were to be found, of changing the names of the places which they traversed, and we must unavoidably conclude that it is no easy task for a traveller to discern true from false.

Among the Oriental works (that treat on this subject) we have only the commentaries of Babereh on which we can rely for exact information. The few modern travellers extant are vague and uncertain. Those regions would procure for any European who would survey them, the glory of throwing a brilliant light on Alexander's mareh, and of enriching science with hitherto unknown facts relative to the Bactrians; in as much as they are overspread with ruins, cupolas, and inscriptions, all referring to those conquerors, and attributed by their actual inhabitants to the Caffrans. They are alluded to by the Chinese Religious, who traversed those countries in the commencement of the 7th century of our era, and whose manuscript exists in the Oriental Library of France. But whatever European may undertake a similar journey, must expect to encounter numberless dangers, and almost insurmountable obstacles from the barbarity of the tribes who inhabit them, and above all from the jealousy of the chiefs, who, naturally suspicious, are always inclined to form sinister judgments of the projects of any stranger who travels through their district. This was the lot of Dr. Henderson, who desirous of crossing those regions to repair to Badakchan, although he was disguised as a fakeer, and had a perfect knowledge of Persian, was seized, stripped, and beaten, for having put his foot in Suwat, and was compelled to return to Peshawur, where I had the good fortune to attend him. Subsequently I myself having become intimate with the chiefs of those regions, had cherished some hope of being enabled personally to explore them; but unfortunately the rank I hold in the army of the Maharajah of Lahore occasioned them so much terror, that they imagined that my researches, far from being actuated by curiosity and an interest for science, were only directed to explore the country, so as to facilitate its conquest by Runjeet Sing. I was thus constrained by their earnest remonstrances to abandon my intention of undertaking such a journey, and to content myself with having recourse to the people of Peshawur to survey secretly the country, so as to acquire some knowledge of its geography.

The items which I have had here transcribed in Persian were collected by them, and I only give them publicity in order to fix the attention of the geographers and archæologists who may happen to come hither after me, and to facilitate thereby the combination of modern

with ancient geography. I may possibly avail myself of these materials hereafter, to furnish a complement to my conjectures on Alexander's marches through Bactria.

The country which I am about to describe, is intersected by three principal rivers, viz. the Khonar, the Pendjecooré, and the Suwat.

The first directs its course S. S. W. along the southern side of the snowy chain above alluded to, dividing Caffristan from the cantons of Bajore and Dhyr, and after rolling its impetuous waters through a bed strewn with rocks, wherein it would be difficult to meet any sand, it falls into the Cabul river, almost opposite the city of Jellalabad. I know not where it rises; some place its source in Cachgar, which it intersects. The proximity of the snowy chain, and the direction of the river's course, denote that it must necessarily have more than one influx. During the liquefaction of the snow it acquires so great a volume of water that it cannot be crossed but on rafts. This river, as I have stated in my memoirs, is denominated *Sind* by the Kaffrees who inhabit its banks, and *Khonar* by the Affghans, a name borrowed from a town that is the capital of a canton or district situated on its western bank, between Jellalabad and Bajore. Some travellers improperly give it the name of *Khameh.** This may be possibly the *Choes* of Arrian, which Alexander coasted on his march to *Suastus*, to which his troops may have given the name of Choes, a corruption probably of that of *Cheva*, a canton situated at its confluence with the Cabul river, which may have anciently given its name to this river, as the town of Khonar gave its own. As the Greeks sometimes translated the names of foreign places, and liked to call them by particular ones somehow connected with the traditions they indiscriminately adopted, they may possibly have *baptized* with the name of Choes one of the rivers of those regions, in memory of the festival of Choes (Χόες) or of the libations which the Athenians celebrated in the month of Anthesterion in honor of Bacchus, and which they also styled Ἀνθεστήρια.

After what Strabo relates, we would be led to suppose that the river in question is his Choaspes, which disembogues, according to him, into the Cophenes.

The Penjecooré rising in Ghilghit, flows between the Khonar and the Suwat: its direction is from north to south. It is called *Penjecooré* because it is formed from the union of *five* other rivers, viz. the Tal, the Laori, the Awchiri, the Neag, and the Jindé; the first of which is the most considerable of the five. Besides those influents, it receives

* This river is marked "*Kama R.*" in Tassin's map.

several others of inferior note, such as the Berravol and the Caron ; the latter intersects the district of Penjecooré between the Awchiri and the Suwat.

The river of Penjecooré is the most considerable in those regions next to that of Cabul ; hence I have to say of this also, that during the liquefaction of the mountain snows it cannot be crossed but with rafts. Without being very deep its current is extremely rapid, and its bed is so sown with rocks and slippery stones, that of ten persons that wade it when its water is low, half are sure to stumble. After leaving Dhyr until its confluence with that of Suwat, it is known by the name of Penjecooré, and thence, until its union with the Cabul river, by that of Suwat.* I am inclined to think that it is the *Guræus* of the Greeks.

Respecting the Suwat, I am at present unable to speak of it, being occupied at this very moment in getting its source explored. The Hindoos only know it by the name of *Sihon pedra nadi*. The latter is undoubtedly the *Soobah Vastoo* of the Chinese Religious, and the *Suastus* of Ptolemy. I would have it here observed, that the Suwat and Penjecooré rivers are frequently confounded with one another by the inhabitants themselves of lower Yousoufzeïs, because they mix their streams before they disembogue into the Cabul river, i.e. the Cophenes. This mistake only takes place below their confluence, which occurs at the point of Goozar Mamani, situated six or eight koss from the ruins of Talache, in as much as above it they retain their distinct denominations.

The Suwat is indisputably the *Suastus* of Arrian, on which Alexander sailed after coasting the Choes.

Of a vast number of ruined cities which those regions present to one's view, those that most deserve the attention of geographers and archæologists are the following :—

1st. The ruins of *Talache*, situated between the confluence of the Penjecooré and the Suwat. In the midst of these massy and immense ruins exists an enormous cupola, of much more elaborate architecture than other monuments of that description, because it is said to support around its base a number of *basso relievos*.

2nd. The ruins of *Berikoot*, attributed to the Caffre Béri, on the eastern side of the Suwat, not far from the city of Manglore, or Mangar, near which is the cupola of Chinguerdar, attributed to Abou-Padsha, and equally remarkable with that of Talache. A beaten

* "*Lundye river*" of Tassin. The "*Penjecooré R.*" of M. Court has no representative in Tassin.

track through a rock leads to those ruins which are delineated on the back and top of the mountain. Farther on, on the same grounds, are those of Hira and Badakhel: the latter, being the vastest of all, are assigned to Doomma Padsha.

3rd. The ruins of the city of *Aritchend*, improperly denominated *Artchend* by the Mahometans. They are observable on a height environed on all quarters by deep ravines. They are eighteen koss north of Peshawur, and six east of Fengui. They are attributed to the Kaffrans, and may possibly be the *Arigæum* of the Greeks, which was razed by them, and whose advantageous position induced Alexander to order Craterus to demolish its walls. To the west of these ruins, and on the western bank of the Suwat and Penjecooré united, lie those of Khound, which reach down to the river.

To the north of Aritchend are the ruins also of *Sakout*, where the impression of a foot is visible, and those of Diguer, situated on the southern side of mount Malekan. To the south of Aritchend are also observable those of Radjer, or Razor, of Seidabad, and Kalader: they are attributed to the Caffre Farikhi.

4th. We cannot consider with equal attention the ruins of Béhi, attributed to the Rajah Verrat, which according to the inhabitants of the place were the former sojourn of the monarchs of that country. They lie to the north east of the present city of Achtnagar, and are situated on the level of mount Béhli, insulated as it is, in the centre of the immense plain of Yousoufzeïs. There are visible there, it is said, grand traces of massy walls, some *basso-relievos*, and the ruins of a subterraneous aqueduct, (which conveyed thither the water of the Penjecooré) after leaving the ruins of Radjer situated close to Achtnagar. Directing your course thence towards Booner you meet, at twelve koss distance, mount *Mahram* which contains also some ruins, and may probably be the *Meros* of Arrian, which Alexander ascended with all his army after taking possession of Nyssa, by our geographers supposed to be identical with Achtnagar. But what destroys this probability is, that the district the Macedonians recognised with jubilee is not discoverable in those parts, and cannot be traced out, but in a more northern latitude beyond the Malekan ridge. I must however here remark, that there are several mountains in those regions called *Mahram*, and among the rest one in Bajore, and another at Cashmeer close to the city.

5th. The ruins of *Meidan*, where a rather unimportant inscription has been reported to me to exist, merit not to pass unnoticed, in consequence of their extent and proximity to the Penjecooré. The same must be said of those of *Ganchal*, situated in the canton of Tul, three days journey north east of Meidan, and twelve koss from Dhyr, as well as

from the castle of Soun, observable to the south of the river Awchiri, and containing lead mines in its vicinity.

6th. The ruins of *Doomma*, situated on a very lofty mountain, whence the surrounding country is discernible; those of Dankool are a little further up. Those cities bear the names of the monarchs that founded them, and are situated in the eastern part of the Yousoufzeïs, not far from the Indus.

7th. I shall draw attention in the last place to the ruins that are two koss to the west of the present town of Dhyr, and which are assigned to the Kaffraus, who were dispossessed of them by the Mahometans, when that city was governed by the Caffer Kirkat. These merit that the greatest attention should be paid to them by travellers, in as much as, after the relations of Kazan Khan, chief of Dhyr, and on account of the combination of the latter name with the *Dyrta* of Arrian, I have scarcely any doubt on my mind that this is the city which Alexander passed, when he was pursuing the brother of Assacanus, and whence he set out for the Indus. If my opinion could be borne out, with such a cue it would be extremely practicable to determine the true positions of Ora, Bazira, Massaga, and other places mentioned by the above historian, concerning which I have been unable to obtain any precise information, notwithstanding the thorough researches I have made. Nevertheless I shall observe that the Hindoos of those districts assured me, that a city called Massangar, known also by the name of Maskhiné, exists on the southern frontier of Kaffristan, close to Baba Kara, twelve koss from Bajore, and four from mount Mahram, which is in that canton. They also added that the tribe called *Assacenis* exists in that country. If such a relation were well-founded, we should discover there the Massaga of the Greeks, the capture of which cost so much blood to Alexander, and the massacre of whose intrepid garrison cast a blemish on the exploits of that conqueror. I am not aware if this Massangar be identical with the one alluded to by Forster, who travelled through Suwat.

I have been similarly assured that there exist in the district of Booner the traces of a town called *Oora*, which has been also denominated *Doora*, and which on account of its proximity to the Indus may probably be the Ora of Arrian, (although Bazira has not been yet discovered in its vicinity) especially as that river is not known higher up, but by the name of *Ab Sind*, whence it may be conjectured, with some probability, that the country it washes in that part may have been the region of that Abissares, on whom our historians waste so many hypotheses, and who, according to Arrian, sent resources to Ores, when Alexander was besieging that city. *Apropos* of Abissares, I do not deem it here

superfluous to remark that there is a mountain two days' journey N. of Dhyr, by name *Ser-Adkamoos-Ouré*, situated on the route leading to Badakchan, a region near which is a place called *Hissar*. This latter word in Hindee signifies a *fortress*, whence the present city of Achtnagar is also known by the name of *Hissar*.

I had also had scrupulous researches made concerning the *Aornos*, but with similar mal-success. Alluding to this rock, I have already observed in my journey through Affghanistan that a similar mount presents itself (with all the peculiarities described by Arrian) in the canton of *Naoghi*, near Bajore, where the vestiges also exist of a city named *Ambar*, which is probably the Ambolima of Ptolemy, placed by him on the lower branch of the Choes or Cophenes.

The persons I commissioned to explore the country about Dhyr reported to me, that in the canton of Laori, near that of Dhyr, there exists a mountain corresponding in all its particulars with the Aornos. Others have assured me that there is a similar one in the canton of Booner, a region, like all the rest of Yousoufzeïs, interspersed with insulated mountains, whither the inhabitants take refuge in case of imminent danger, and which, considering the proximity of the city of Amb, capital of a canton situated on the Indus, renders such an opinion sufficiently probable. I must also subjoin, that beyond the territory Mola Goori, situated below the confluence of the Penjccoorá and the Suwat, to the west of both those rivers united, a mountain is observable called *Salata*, and also named *Azarno*, which on account of its insulated position and elevated form, resembling a flattened or headless cone, may be easily taken for the Aornos. This mount is quite perceptible from Peshawur, behind the defile of Fengui, as its summits far surpass the Malekan ridge. I shall also observe that on mount Guendeguer, to the N. E. of Azerou, places situated to the east of the Indus, there is the fort of *Serikoot*, a name bearing a striking resemblance to that of *Sisicotte*, to which Alexander confided the garrison of Aornos. The former is a renowned stronghold of those regions, having cost the Seiks a great deal of blood, and being the place whither the inhabitants of the surrounding countries resort for shelter in cases of peculiar peril.

After surmises of this sort, we must infer that it is extremely difficult to know which opinion to embrace, especially as the ancient historians themselves are not agreed on this important point, which constitutes one of the most brilliant of Alexander's exploits. Arrian collocates Aornos near Bazira; Strabo towards the sources of the Indus; and Quintus Curtius on the banks of that river. With reference to the latter opinion, I would observe, that a rock exists opposite

Attok, with all the peculiarities described by him, on a mountain that is topped by a castle, attributed to Rajah Hody. It cannot be ascended but on the side of the Indus, by a steep passage hewn through the rock, and enclosed by two walls of defence, running up zig-zag according to the protuberances of the mount. The space immured by those walls is filled with ruins of habitations gradually rising from the brink of the river up to the castle. Those works are all entire, and have the appearance of great antiquity. The three heights whereon Alexander sacrificed to the gods still exist, but I must avow that no arable ground or spring can be discovered. There are only two reservoirs built by the vizier of Zamenchah. The heights are at present occupied by small forts defended by the *Mazbis*, an Indian sect in the service of the Maharajah of Lahore.

Of the great number of cupolas existing in those regions I shall distinguish the following :—

1st. That of Talache, which I have already alluded to, and the five or six others that are discoverable not far from those ruins, in the defile that leads from the Suwat to the Penjecooré.

2nd. That of Chinguerdar, situated between the ruins of Berikoot and the town of Manglore. Another is observable more to the southward.

3rd. That of Charbag, present capital of Suwat.

4th. Those that exist among the ruins of Sedougan, to the east of Manglore.

5th. Those of Berikoot, situated near the village of Nakmira.

6th. That of Charkootliá, fifteen koss to the east of Aritchend, as well as that near the ruins of Seidabad. The latter is as large as that of Chinguerdar.

7th. That of Sepel-banda, near the village of Kharí, and as large as that of Chinguerdar.

8th. Those of Heniapoor, one of which is near the village of Fooraseuk, and the other under mount Jaffer.

9th. That near Sonigheran.

10th. The two existing on the ruins situated at the foot of mount Sookker, near the village of Riga.

11th. Those in the villages of Fakttahind and Caboolgheram.

12th. Those, in fine, of Chammely, situated on the top of a mountain.

All those massy cupolas which I am describing, are in the Yousoufzeïs territories, by which is meant all the territory comprised between the Indus and Penjecooré, from the snowy chain to the lower branch of the

Cabul river, viz. the Cophenes, and which includes Yousoufzeïs proper, Booner, upper and lower Suwat, Penjecooré, and the dependencies of Dhyr.

Remarkable places being points that may serve for comparative geography, as well as rivers and mountains, I shall select the following for observation :—

1st. The cave Cashmeer Ghar, situated in the territory of the Baboozeïs, on a mountain which cannot be ascended but by a steep passage, hewn in a great measure out of the rock. This place is also called Pelley, and is sixteen koss from the town of Soukhor. The cave is said to be of an immeasurable depth, and to have so large an aperture, that it is impossible to discern the direction by casting in a stone. As both sides of the entrance are of solid masonry, and the front is encumbered with enormous cut stones, one would imagine that it is one of the subterraneous temples attributed to the Pandoovans, or to the Caffers. At present it is a place of shelter for myriads of wood-pigeons. Quite close to it are visible the traces of a town or castle, whence idols are sometimes dug up ; a basin also is observable there continually supplied with water. I had been assured that an inscription was discoverable, but my men could trace out none whatever. I am not aware if this cave be identical with that of Roostam, to which I have alluded in my description of Yousoufzeïs.

2nd. The sandy cave of Dekia, situated at the foot of mount Ghardoom in the district of Dhyr, on which there are the traces of a town.

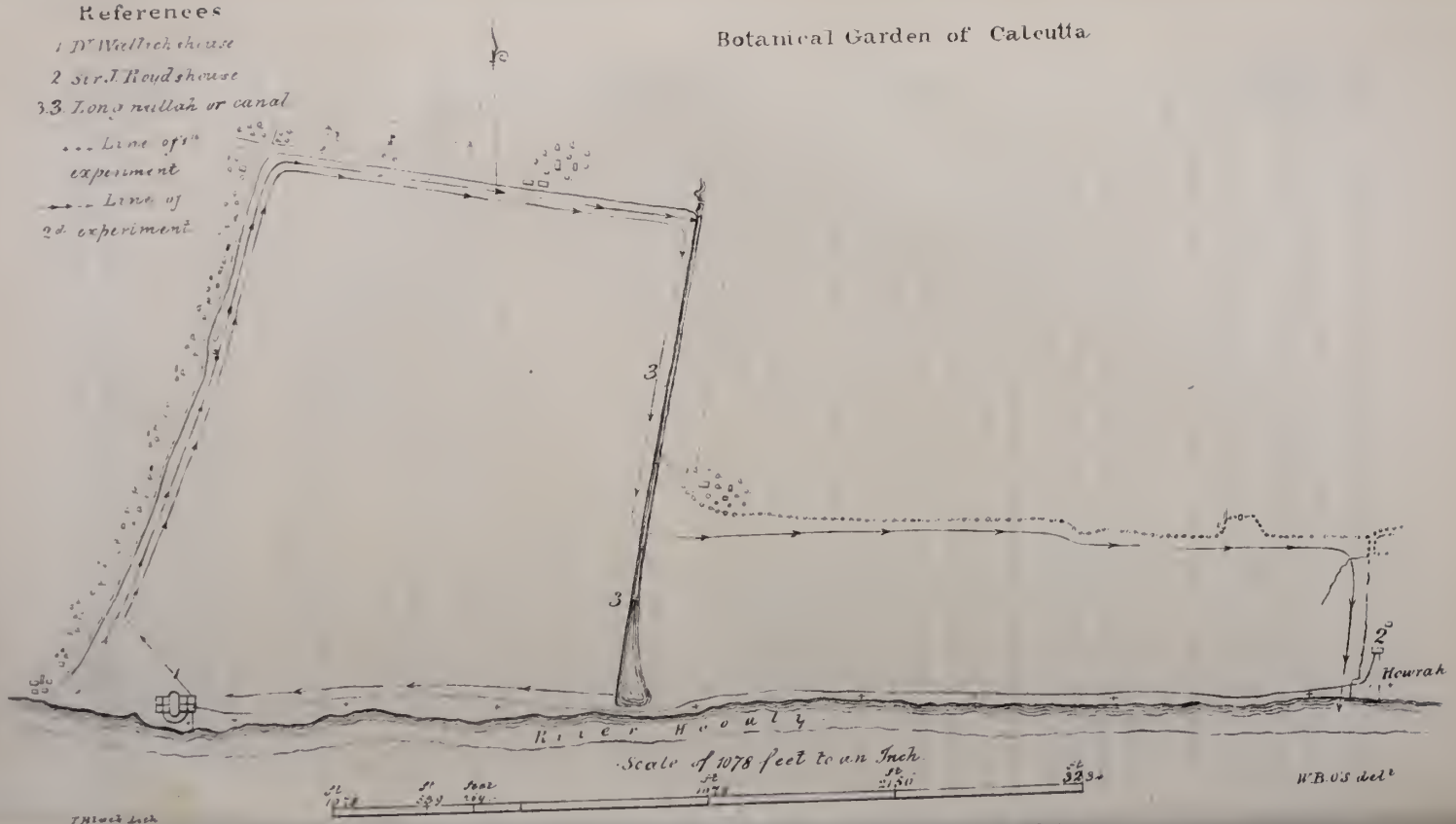
3rd. The Khial cave, near the ruins of Meidan, in the canton of Bajore.

4th. The vast basin that exists on mount Bikary, to the west of Dhyr, being a place of pilgrimage for the Hindoos, who give out that their *Pir* disappeared on that spot.

5th. The basin situated to the east of Dhyr in the district of Tal, where a fire exists under a cupola maintained from time immemorial, and kept up at present by a Guebrian woman.

6th. Lake Mansoroor in Bajore, situated on a mountain fifteen koss from Bendy Berravol, which is continually supplied with water in consequence of the perpetual snow.

7th. Mount Hilo, situated in Yousoufzeïs, by the Mahometans denominated *Hilum Pilum*, and by the Hindoos *Ramtakt*. This place is much frequented by the latter, who perform an annual pilgrimage thither during the month of April, in memory of Rajah Ramtchend. Those Hindoos likewise make the pilgrimage of Chamra, situated near Ootchan, country of the Samoozeïs


References
1 Dr Wallich's house
2 Str. J Roud's house
3.3 Long nullah or canal
... Line of 1st experiment
--- Line of 2d experiment
Botanical Garden of Calcutta
3
3
2
Howrah
River Hooghly
Scale of 1078 feet to an Inch
W.B.OS del.
T.H.Lock Lith.

Prior to my drawing this article to a close, I deem it an interesting topic, to make an observation on the region of Tchêlas, situated on the eastern bank of the Indus, four days' journey (more northward) from Pakhley and Dembor. This region is said to be highly remarkable for the number of ruined towns it contains. Although situated in the neighbourhood of the snowy chain, it may well have been the *Taktcha-shilas* of the Chinese Religious, a word which may be decomposed into *takt*, a throne, *chah*, a king, and *shilas* a corruption of *Tchelas;* and thus form a ground for a probable hypothesis, that the Greeks thence derived their *Taxila*. The inhabitants of Upper Suwat who repair to Tchêlas, cross the Indus at Goozer Chekhi, whence is visible on the eastern bank mount Mehoor, situated almost opposite the Cabool-Gheram ruins, which are discoverable on the contrary beach.

Higher up, on the upper branch of the Indus, lie the regions of Ghilghit, Ashoor, Goræi, Khélooman, and Balooman, formerly inhabited by the Caffers.

The ferry points of the Indus from Attok to the snowy ridge are the following: Attok, Bazar Hound, Monarí, Pehoor, Notchy, Kabbel, Chetabha, Amb, Derbend, Chetterbahi, Mabera, Toohara, Marer, Didel, Kamatche, Behar, Pachetlehi, Guendoo, Mattial, Battera, Jendial, and Manial, Kallchi, Palles-pattan, Pohoo-Goodje, Koonchir and Jalkoot.

ART. IV.—*Remarks upon the Rain and Drought of the last Eight Seasons in India. By the* REV. R. EVEREST, *Landour.*

In two former papers I endeavoured to trace the variations of the past seasons, as to drought and moisture, by means of the prices of corn, having assumed that the wettest years produced the most abundant harvest, and the driest the reverse. An examination of the subject shewed that the more extensively the averages of prices were taken, the greater approximation there was to a regular ascending and descending series, or curve, with recurrent periods of from six to ten years; thus leading to the belief, that, if the average of certain atmospherical phenomena over a surface sufficiently extensive could be taken, the result would exhibit recurrences nearly or altogether regular. I will now shew how far the Register of the different Rain Gauges corroborate or not this opinion. The following are the annual depths of Rain that have fallen in different parts of India during the last eight years.

	Calcutta, inches.	Madras, inches.	Bombay, inches.	Dehli, inches.
1831	58·78	40·30	99·64	..
1832	50·25	20·07	78·20	..
1833	60·36	36·99	71·00	14·15
1834	68 73	40·17	66·59	36·85
1835	85·50	37·26	62·19	27·70
1836	45·66	47·59	87·99	35·00
1837	43·61	49·27	64·99	10·55
1838	53·02	54·33	50·78	20·31

To obtain the average variation, let us take the maximum and minimum at each place, and divide the whole difference between them into one thousand parts; then for the number itself substitute the proportional part of the difference.

	1835	1837
Thus at Calcutta we have	85·50	43·66
These will by the proposed substitution become ...	1000	000

and the whole will stand thus:—

	Calcutta.	Madras.	Bombay.	Dehli.	Average.
1831	362	295	769	..	475
1832	158	000	441	..	200 —
1833	400	246	452	137	309
1834	600	293	401	1000	573
1835	1000	250	352	652	563
1836	050	401	635	929	504
1837	000	425	376	000	200 —
1838	225	499	216	371	328

It appears from this average that the minimum has recurred in five years, which is a period somewhat shorter than we should have been led to expect from an examination of the prices of corn for many years back.

I have before stated, as one of the results of such an examination, that there was a more perfect recurrence at the end of fifty six years than at any other period. Thus comparing together different years with that interval between them, we have the following:—

Maxim: or years of abundance. 1815.....1822-23.....1829.....1835-36
.....1759.....1767 1773

Minim: or years of scarcity. 1819-20.....1826.....1832
.....1763 1770.....1776

In searching for data to elucidate this part of the subject, I obtained sight of an old manuscript Register in the Surveyor General's Office, from which I was enabled to compare the annual amounts of rain for the last eight seasons with those fifty-six years before. The Register appears to be imperfect, and, unfortunately, to have been kept by an illiterate person. The daily entries begin towards the latter end of 1776, but, from a note we learn what had been the annual amount of rain both in that year, and in the year previous. I here subjoin them, and place by the side of each the depths registered 56 years afterwards.

Annual depth of rain at Calcutta in inches.

	Rain inches		Rain inches
1775	55·24	58·78	1831
—1776	39·26	50·25	1832—
1777	62·07	60·36	1833
17 8	59·30	68·73	1834
+1779	64·51	85·50	1835+
1780	64·20	45·66	1836
1781	59·90	43·61	1837—
—1782	41·07	53·02	1838
1783	52·22		
1784	51·58		
+1785	69·75		

It will be observed that the depths are much less in the earlier period than in the later. This is partly owing to the height of the Gauge above the ground in the former case, for which allowance might be made, but this would not be worth while, as there are other sources of error which could not be calculated. For the years 1784-85 we have another register published in the Asiatic Researches, which gives the annual amount thus :—

Year,	1784 1785.
Inches,	81·0 77·5

Let us now recapitulate the principal *maxima* and *minima* for 56 years. They are—

Max. 1779...1786...1796...1806...1815...1822–23...1829...1835–36
Min. . . 1782–3...1792–3...1802...1811–12...1819–20...1826...1832

The *maxima* for Bengal are generally earlier than the above. They are, 1784–5 1794 1804 1813.

On referring to the list we see that no *minimum* recurred at the end of 56 years from 1782 viz. in 1838 ; but somewhat earlier, viz. in 1837. It was not, however, to be expected that the recurrences would happen regularly in the same locality, and our lists are much too few to enable us to estimate the average effect over the whole surface of the country. The *maxima* above stated shew very nearly four equal intervals of seven years each = 28 years; one of ten years, and two of nine years each = 28 years.

Admitting the case to be as we have supposed, then we might reasonably expect that similar phenomena would be observed in other parts of the world, in particular, such lakes or large natural reservoirs as the Caspian, and the North American lakes would indicate, by their increase or diminution, the variations of the seasons over an extended surface, better than any other artificial means that could be devised. In Brewster's Edin. Journal of Science, vol. 7. 1827 (July to October), we find a paper by Mr. De Witt Clinton, on the periodical rise and fall of the North American lakes. Unfortunately no record has been kept of the changes, but it is stated that there is a rise for three years, and a corresponding declension—being altogether a period of six years. It is added, that some extend the time of rise to five, and others to nineteen

years. Probably these periods would be more correctly stated at $4\frac{2}{3}$ and $9\frac{1}{3}$ years respectively, which would give recurrences at the end of nine and nineteen years. Some particular times of *maxima* and *minima* are stated; they are—

Max. 1797 1815.
Min. 1802–1811 1822.

These numbers (except the last) nearly coincide with our own, which are for the same period—

Max. 1796 1806 1815 1822.
Min. 1802 1811

It must be recollected that these periods of the North American lakes are only stated from the memory of the inhabitants; and besides it is almost too much to expect that the changes in distant parts of the world should be exactly contemporaneous.

Art. V.—*Statistical Record of the duration of diseases in* 13,019 *fatal cases in Hindoos.—Extraordinary mortality among Lying-in Women—Compiled by Dr.* Duncan Stewart, *Superintendent General of Vaccination.*

Note. The Table is compiled from the Bills of Hindoo Mortality kept by the Police authorities at the different ghauts where Hindoo obsequies are performed. The information is derived from the relatives accompanying the body to the ghaut, and is therefore not liable to suspicion, although there may be some little laxity on particular points. The registers thus obtained assign the name, age, sex, caste, occupation, and residence of every individual—the illness whereof he died, and the number of days he was ill—also the names of his father, of his nearest heir, his priest, and the doctor who attended him. Some of the former items I have elsewhere tabulated for the information of the Municipal Committee, in illustration of the localities in Calcutta most favorable

to the generation and concentration of disease, and of the ratio of mortality in each Thannah, as also the influences of age, sex, and season upon the course of disease among the natives.

The present Table has reference chiefly to the comparative prevalence of particular diseases, and to the duration of these in a majority of cases before they *kill*. It must be remembered that none of the subjects here classified enjoyed the benefits of Hospital treatment, and but very few probably of Dispensary aid, or of European skill in any form; yet the Table will be interesting, if on this account alone, by exhibiting in comparison with similar Tables, the results of Hospital or Dispensary practice here and in Europe.

The rapid fatality of tropical diseases in their early stages, is remarkably shown; and with reference particularly to the diseases of child-bed, there is more than sufficient to compel the conviction not only of the existence of many unhappily fatal habits and prejudices on the part of the people, but of most barbarous, perhaps sinful, obstetricy on the part of the practitioners. The mortality in child-bed is *one-tenth* of the whole; that is, equal to one-fifth of all the deaths among females. Of the fatal cases, more than half occur during the three first days, in other words "in the birth," and of the remainder a large majority fall victims to puerperal diseases within 15 days. So frightful a picture is not to be met with in the records of humanity; yet so little has it been known or suspected, that only two years ago the India Company's examining Physician in London actually struck out of the medical indent from this country the entire of the obstetric instruments, stating as a reason, that "the relaxing effects of the climate rendered the use of instruments at all times unnecessary."

The subject has lately attracted attention here in an influential quarter, and such disclosures as the present will, it is hoped, lead to the institution of measures calculated to prevent the fearful waste of life from such causes.

[*Table shewing, &c.*

Table shewing the Duration of particular Diseases in 13,019 *fatal Cases among Hindoos.—Calcutta* 29*th May,* 1839.

	Number of Days the disease existed before Death.																											Ditto of Months.										Ditto of years.						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	1	2	3	4	5	6	7	8	9	10	11	1	2	3	Total.
Cases of Dysentery.	..	2	2	3	3	2	3	1	2	9	4	13	2	4	22	5	4	..	2	11	..	1	..	2	4	..	..	..	..	77	60	33	11	10	22	4	6	1	10	1	17	7	2	362
Simple Fever	2	..	9	7	13	13	7	21	4	15	9	10	5	2	18	3	2	5	1	4	1	1	1	1	1	..	..	..	..	73	82	60	34	9	44	10	18	3	2	1	33	22	4	550
Typhus Fever	50	100	239	269	308	258	361	561	299	476	300	356	177	178	236	109	91	90	62	125	105	68	15	12	39	8	10	10	1	153	42	..	2	..	2	..	..	..	..	..	..	..	..	5,118
Small Pox.	..	4	6	6	12	17	18	19	36	24	30	41	55	69	50	25	17	13	4	11	12	6	..	2	3	3	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	488
Cholera.	918	2211	900	347	158	74	44	56	11	17	9	15	3	..	7	1	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4,773
Childbed disease.	356	208	146	88	89	49	46	42	29	36	30	32	23	23	58	7	3	2	7	2	19	10	..	2	3	1	..	..	..	14	2	1	..	..	..	..	..	..	..	..	..	..	..	1,328
																																											13,019	

D. STEWART, M. D.
Surgeon to Park Street Dispensary.

We propose to return in our next Number to the consideration of the subject which Dr. Stewart, has laid before us in such an appalling form.—Eds.

ART. VI.—*Summary description of four new species of* Otter. *By* B. H. HODGSON, ESQ., *Resident at Catmandu, Nepal.*

To the Editor of the Asiatic Journal.

SIR,

One of the most remarkable features of the mammalogy of Nepal is the great number of distinct species of *Otter* characterising it. There are at least seven species, I believe, though not one of them is numerous in individuals, at least not in comparison of the common Otter of commerce, which is produced in the neighbourhood of Dacca and Sylhet. This rarity of species, added to the circumstance of the animals not being regularly hunted for their skins, renders it very difficult to procure live specimens; and without live specimens—which may be slain and their osteological as well as other characters thus accurately examined—the discrimination of specific differences is a work of extreme labour and delay. Many years ago I announced to Mr. Bennett, the late Secretary of the London Zoological Society, the fact that there are several species of *Lutra* in Nepal, and before he died he was nearly convinced of the correctness of the statement, though I could not then, nor can now, give a full exposition of even those with which I am best acquainted.

Waiting, however, for the perfect knowledge when the materials of it are not under command, is, I find, like waiting on the river's side for a dry passage after the waters have flowed past; and I shall therefore offer no apology for briefly characterising those four of the seven Nepalese species of Otter of which I have considerable certainty, leaving the remaining three to some future occasion.

GENUS LUTRA.

1*st. Species*—TARAYENSIS NOBIS.

Size, medial. *Structure*, typical. Scull and head much depressed. Lower incisors ranged nearly in line. Tail equal to two-thirds the length of the animal, and much depressed. Form, robust. Nails compressed, exserted from the finger ends, and acute. Fur short and smooth. *Colour*—above, clear umber; below, and the hands and feet, pure yellowish white; the yellow tint deepest on the limbs; the pale colour on the head and neck extending upwards to the line of the ears—less so on the body; and the distinction of dark and pale hues very decidedly marked. Tail above and below, dark.

2*d. Species*—MONTICOLUS NOBIS.

Size, large. *Structure*, upon the whole, similar to the above. Tail equal to more than two-thirds of the animal, and less depressed. Scull and head less depressed. Intermediate incisors of lower jaw ranged entirely within or behind the line of the rest. *Colour*—above, deeper than the above, or bistre brown; below, sordid hoary, vaguely defined, except on the edge of the lips and chin; limbs nearly as dark as the body. Fur longer and rough, or porrect from the skin in a considerable degree.

3*d. Species*—INDIGITATUS NOBIS.

General form and proportions of *Leptonyx*, to which it is affined. Habit of body more vermiform than in the above. Tail but half the length of the animal. Toes very short, and more than half buried in the palmary mass. Nails short and worn, but not depressed nor truncated, as in *Leptonyx*. *Size*, medial. *Colour*—same as in the last, but deeper still, or dusky bistre; paler and ruddier on the body below, and albescent on the head below; but the colours not well defined, and only really distinct (except in shade) on the inferior surface of the head. Character of the fur as in the last, and indeed in all the mountain species.

4*th Species*—AURO-BRUNNEUS NOBIS.

Size, small. Habit of body still more vermiform. Tail less than two-thirds of the length of the body. Toes and nails fully developed. Fur longish and rough, as before. *Colour*—rich chesnut brown (the fruit) above; and golden red below and on the extremities.

Remarks.—The three last species are confined to the mountains, as is the first species to the plains at their foot. The dimensions in inches, and the weight of the four species are as follow:—

	1	2	3	4
Tip of snout to base of tail .	26 to 28	30 to 32	22 to 24	20 to 22
Tail . . .	16	20	10½	12 to 13
Weight .	16 to 20 lbs.	20 to 24	11 to 13	9 to 11

I am, Sir,
Your obedient servant,
B. H. HODGSON.

Nepal, May, 1839.

ART. VII.—*On the Geographic Distribution of the Vulturidæ, Falconidæ, and Strigidæ; being the first of a series of memoirs intended to illustrate the Geographic Distribution of the Ornithological Kingdom. By* WM. JAMESON, ESQ. *Assistant Surgeon Bengal Medical Service, &c.*

Of all the departments of zoology, there is probably not one which has attracted less the attention of naturalists than that of the geographic distribution of the animal kingdom; although from a study of it many details may be derived of essential importance to several of the other branches of natural history. To elucidate partially the distribution of one division of zoology, viz. ornithology, is the subject of the series of memoirs intended to be presented to the Society.

In entering upon a subject like the present, we do so with the greatest diffidence, from the confusion which has existed, and still reigns in the systematic department of ornithology. The number of synonymous genera—some authors applying a certain suite of characters to a particular genus, others another suite either more or less extensive, and some applying the name, but at the same time ignorant of the characters upon which the genus is based, of which we have many examples, and these too in works published at the present day—have presented to us difficulties of no ordinary nature. To overcome these, we have examined minutely the magnificent collection in the Edinburgh Royal Museum, as well as the principal public and private collections throughout England.

The system of arrangement we have adopted is that of the Baron Cuvier, with certain modifications, which is undoubtedly the best at the present moment. The system of Macleay, when properly followed out, will probably however supersede all others. The attempts which have as yet been made are very unsatisfactory, the best is that of Vigors. Mr. Swainson in trying to find out his analogies, does not on many occasions at all take into consideration the possibility of many groups of birds having disappeared from the surface of our globe. His views, no doubt, are very ingenious, but must be received with due caution. We have adopted several of the new genera lately proposed by Vigors, Lesson, Swainson, &c. these we shall notice in their proper place.

When we take a general view of the ornithology of Asia, Africa, Australia, North and South America, we find that it is in a manner unknown. Of Europe and North America we have no doubt complete lists of the species, but the remarks on their distribution are of a loose, and unsatisfactory nature. The local *Faunas* published are few in

number, and in general they have not been drawn up with that care and precision, and upon the system, now necessary, authors being content in mentioning the mere occurrence of the species. In regard to the birds of Britain, we have some good details in the works of Montague, Yarrel, Fleming, Selby, Jenyns. Again the works of Temminck, Naumann, Buhm, Berger, Gould, &c., afford us some valuable information upon the birds of Europe generally. The ornithology of Asia has not attracted the particular attention of any naturalist, at least we have no complete work. In the writings of Horsfield, Raffles, Sonnerat, Leschenault, Duvaucel, Diard, Sykes, Vigors, Franklin, Gould, Hodgson, Dussumier, Belanger, Boié, Kuhl, Van Hasselt, &c.,—some of whom forfeited their lives in the pursuit of this their favourite study—we have many valuable details.

In regard to the birds of Africa, the works of Le Vaillant stand pre-eminently forward, and which have increased much our knowledge in this department; but his researches are almost entirely confined to the southern part of that continent. To Dr. Smith we are also indebted for much valuable information, and we look forward with much interest to his work, which is soon to issue from the press. Mr. Swainson has added a little to our knowledge in regard to the birds of western Africa, but there is still a vast deal to be done in this quarter. Ruppell has published some excellent observations on the birds of Nubia and Abyssinia, and the ornithology of Egypt has been partially elucidated by Savigny in his great work.

To Australia the same remark applies. We have no complete general work. From the writings of Brown, Lewin, White, Vigors, Horsfield, King, Phillips, Lesson, Quoy, Gaimard, Poren, Lansdorf, Gould, much valuable information may be obtained. The last individual mentioned is at present engaged publishing a work, illustrated with figures of the heads of the birds of New Holland, and we hope soon to have a complete *Fauna* from the same author, who is at present travelling through that country in order to illustrate its zoology.

The northern half of the new world has received much greater attention, and its ornithology is better known than any other continent with the exception of Europe. For this we are indebted to the indefatigable exertions of Wilson, Audubon, Prince Lucien Bonaparte, Nuttal, Ord, Richardson, Swainson, Sabine, Ross, Douglass, Lichtenstein, &c.

With regard to the ornithology of the southern continent of America, we are lamentably deficient in information. From the writings of Spix, Prince D'Neuwied, D'Orbigny, D'Azara, Swainson, some information may be obtained.

From numerous general works much valuable information may be received, to notice all of which would occupy too much space. Among the authors we may mention Temminck, Cuvier, Latham, Shaw, Buffon, Vieillot, Lesson, Wagler, Jardine, Selby, Drahiez, Lichtenstein, Illiger &c. To Illiger, however, we are indebted for having first taken up the particular subject of ornithological distribution, and which he has handled in a masterly manner, in a paper published in the transactions of the Royal Academy of Berlin; nor did he direct his attention to the distribution of the ornithological kingdom alone. In the same transactions we find him discussing mammalia in a similar manner. Illiger, however, in his paper on birds only notices the distribution of about three thousand species, being little more than one-half of what is now known; and, moreover, most of his observations are now inaccurate, our information in this department being much more extensive. Prince Lucien Bonaparte has lately published some observations upon this subject, but probably too general to be of much value; and, lastly, we may state that Mr. Swainson has lately devoted some attention to this subject, with what success, we shall afterwards have occasion to point out; in the mean time we may remark, that most of the observations which he has published seem to be more for the purpose of supporting a favourite theory, than tending to advance ornithological geography.

We cannot omit noticing that several excellent monographs of particular families have been published, among which we would particularly mark out those of Wagler and Kuhl, upon the *Psittacidæ*—Lesson on the *Trochilidæ*—Gould on the *Rhamphastidæ* and *Trogonidæ*—and also Wagler's System a Avium, which may be considered as a series of monographs brought into one focus. A continuation of this work will be found in Oken's Isis. Numerous papers on genera and species have been published in the transactions of various Societies and Periodicals, which however we shall notice when we have occasion to consult them.

Having now given a rapid sketch of the present state of ornithology as far as the distribution of birds is concerned, we shall proceed to the subject of our communication.

Birds, considered geographically, may be divided into four grand divisions, viz. 1st. Those which are universally distributed; that is, found in all the great continents of the world. 2nd. Those which are generally distributed, or found in three or more continents. 3rd. Partially distributed, or those found in two continents. And 4th. Continently distributed, or those found in but one continent; which last division may be again subdivided with those which are generally distributed throughout the continent, or confined to a part, or island, belonging to that continent.

For these four grand divisions which we have now proposed, and for the purpose of simplification, and to prevent repetition, we have adopted the following terms:—To the first division we apply the term *Katholiko-dianamial;* to the second, *Geniko-dianamial;* to the third, *Adiko-dianamial;* and to the fourth, *Topiko-dianamial.*

In illustration of this arrangement, which we think, in conjunction with a continual tabular view, is well adapted for tracing the distribution of the ornithological kingdom, we may notice a few examples. Belonging to our first, or *Katholiko-dianamial* division, we have the genera *Falco, Turdus, Anas, Columba, Fringilla, Muscicapa, Corvus, Hirundo, Ardea,* &c. To our second, or *Geniko-dianamial* division, belong the genera *Vultur, Picus, Mycteria, Phœnicopterus, Trogon, Upupa, Oriolus, Tetrao nacifraga,* &c. To our third, or *Adiko-dianamial* division, belong the genera, *Bucco, Trochilus Ocypterus, Accentor, Buceros,* &c. And to our fourth, or *Topiko-dianamial* division, belong the genera *Scriculus, Buphaga, Eurylaimus, Menura, Alectura, Musophaga, Calyptomina* &c.

No doubt objections may be thrown out against the system of arrangement now proposed, in particular in regard to the last two divisions; for in nearly all the continents we have tropical, temperate, and arctic climates; and it is seldom that genera extend throughout all these; nor do we mean to infer this; all that we suppose is, that species belonging to any particular genus noticed extend more or less over that continent.

Birds of prey from the most early times have been divided into two grand divisions, viz. the Diurnal and the Nocturnal; the former comprehending the Vultures and Hawks; the latter the Owls. We shall therefore first notice the Vultures.

Vultures taken as a whole belong to our second, or *Geniko-dianamial* division, being found in all the continents of the world, with the exception of New Holland; true Vultures never being found in it, as far as we are aware, their distribution not extending further in that direction than the Indian islands. No doubt Mr. Swainson has described his rasorial type of the Vultures as peculiar to this continent. With all due deference to Mr. Swainson as a naturalist, we cannot but state that we have here a most extraordinary instance of the danger of being misled by a favourite theory, for in this instance Mr. Swainson is as much entitled, in fact more so, to consider the common wild Turkey of North America as his rasorial type of that group; it presenting a greater analogy to the Vultures than the *Alectura*, Latham, which in its habits and manners is a true gallinaceous bird.

But although the Vultures considered as a family present a very

extensive distribution, yet in their subdivisions they are more restricted; for we find the Vultures, properly so called, entirely in the Old world, their place being supplied in the New by the species of the genus *Sarcoramphus*. Nor do the different divisions of the Vultures stand thus alone in representing each other in the different continents, it being a law extending through many groups of the ornithological system. Thus the *Platyrhynchi* of the New world are represented in Asia by the *Eurylaimedæ*. The *Pardalotidæ* of Australia are represented in Asia by the *Calyptomenidæ*, and in the New world by the *Piprinæ*. The *Buccomidæ* of Asia are represented in Africa by the *Pogonidæ*, and in the new world by the *Tamatiadæ*. The *Rhamphastidæ* of South America are represented in Asia and Africa by the *Bucconidæ*, and in Australia by the *Scythropidæ*. The *Oriolidæ* of the Old world are represented by the *Quiscalidæ* in the New, which group, with one exception, as in the *Piprinæ*, is confined to America. The *Meleagridæ* of America are represented in Africa by the *Numidæ*, in Asia by the *Phasianidæ*, and in Australia by the *Alectoridæ*. And, lastly, the *Struthionidæ* of Africa are represented in America by the *Rheadæ*, in Australia by the *Casuaridæ*, and in Europe and Asia by the *Otidæ*. Numerous other examples could be given, but there are still a great many genera which form as it were isolated examples to individual continents, and for which we cannot find any representations. Thus we have no tribe in New Holland to represent the *Picianæ*; no tribe in Europe to represent the *Psittacidæ*; no tribe in Asia, Australia, or America to represent the *Scopidæ* of Africa; and, in fine, no tribe in any of the other continents to represent the *Musophagidæ* or *Gypogeranidæ* of Africa. Whether there ever existed in the different continents groups representing each other to a greater extent than we have at present, will probably remain a mystery, even although organic remains should be found; birds not presenting in their osteology, at least in many cases, sufficiently marked characters. Comprehended in the genus Vulture, properly so called, we have eleven species; of those, three are found in Europe, but none proper to it, being also found in Asia and Africa; in Asia six, three of which are properly, one of them being also found in the Indian islands; in Africa eight, five of which are proper; supplying their place, as already stated, we have in the New world *Sarcoramphi*, of which there are four species common to North and South America, if the opinion of Nuttal is correct in regard to the occurrence of the Condor in the North American continent. It is probable however that it may have been confounded with the *Sarcoramphus Californianus*, a nearly allied species. The *Sarcoramphus papa* seldom goes as far north as the United States; Bonaparte states that it is occasionally met with in Florida, which is pro-

bably its northern limit. It is described by D'Azara as common in Paraguay, but he states it does not pass the 32° of south latitude; in the intermediate countries it appears to be very abundant. The genus *Cathartes*, consisting of two species, is also confined to North and South America, its place being supplied in the Eastern hemisphere by the genus *Neophron*, represented by the *Neophron percnopterus*, a species common to Europe, Asia and Africa.

Adding together the species belonging to the different divisions of Vultures, we have thus only eighteen known; a small proportion when compared either to the Falcons or Owls, but the numbers in which they occur fully compensate for this. The warmer regions of Africa and Asia must be considered as the metropolis of the Vultures, properly so called.

We now enter upon the second division of the *Falconidæ*, which has been divided by the Baron Cuvier into two grand divisions, viz. the noble and ignoble Birds of Prey; the former comprehending the Falcons, properly so called, the latter the Eagles, *Hierofalco*.

The *Falconidæ* considered as one group, possess very extensive distribution, belonging to our *Katholiko-dianamial* division, occurring from the 80° of north latitude to the equator, and from the equator to the 55° of south latitude, and in all the intermediate spaces; yet when taken generically, many of them, as in the *Vulturidæ*, have a rather restricted distribution.

Of the genus *Falco*, properly so called, we have representatives in all the different continents, but in Europe we meet with the greatest number of typical species; not one of which, however, is confined to it. Thus of the forty-four species contained in the genera *Falco*, *Hierofalco*, *Hierax*, *Harpagus*, *Lophotes*, and *Erythropus*, nine are found in Europe, of which two are proper to it, belonging, one to the genus * * * the other to the genus *Erythropus*; in Asia twelve, five of which are proper, three of these found also in the Indian islands; in Africa eighteen, eleven of which are proper; in Australia five, and four proper; in North America five, and one proper; and in South America twelve, and of these ten proper. Of the other seven species found in Europe, but not proper to it, three are common to Europe and Asia, one common to Europe, Asia, and North America, one common to Europe and North America, one common to Europe and Africa, and one common to Europe, Australia(?), North and South America.

It may be laid down as a well ascertained fact, that birds of temperate, and many birds of arctic, countries—that is, those birds which are known to breed there—possess a much wider distribution than those

* Word illegible in M. S.—Eds

of tropical countries; for in very few instances do we find birds of tropical countries extending their migrations to temperate countries,—a statement which is applicable to more than a third of the birds of Europe. But although we find these European birds inhabiting regions within the tropics, yet we in general find them in those places whose mean annual temperature is little above that of Europe, caused either by the position or form of the country. To this rule however we have several exceptions, as in the *Sturnus vulgaris*, *Pastor roseus*, *Oriolus galbula*, which inhabit both tropical and temperate regions, although probably more abundant, at least the last two mentioned, in the former. It may also be noticed as a curious fact, the reason for which is yet unexplained, viz. that the European species which are found in tropical countries are in general smaller, although identical in every other character with the same bird found in Europe; in other cases we find them not only smaller, but at the same time undergoing slight modifications, which, however, are permanent, and therefore entitling us to consider them as new species and the representatives, in the particular regions in which they are found, of the European. Such is the case with regard to the Nut-hatch, Blackbird, Goldfinch, Siskin, Nut-cracker, Field-fare, Music Thrush, &c. all of which are found in India. *(To be continued.)*

ART. VIII.—*On the use of Wells, &c. in foundations; as practised by the natives of the northern Doab. By Captain* CAUTLEY, *Superintendent of the Doab Canal.*

Piles and caissons being the usual means adopted for foundations in Europe, where the soil and substrata are insufficient, I will venture a few remarks on the system adopted in northern India* for the same purpose, especially in the application of hollow cylinders, or wells of masonry. The plan of undersinking wells does not appear to be totally unknown, although it is not practised in England; in fact the only approach to the method upon which I am now about to occupy the pages of this Journal, is exhibited in the works at the Thames Tunnel, at the descent to which Brunel has sunk masonry cylinders "fifty feet in diameter, strongly clamped with iron, &c." the process of effecting which I have no means of describing. Our Upper Indian system, however, is so admirably adapted to the purposes for which it is intended, and so much superior to pileing (caissons I put out of the ques-

* The undersinking of wells, and their use in foundations, is not confined to the northern Doab; it is practised in Bengal and other parts of India.

tion) that a few remarks, drawn from practical observation, may perhaps induce others, with more information than myself, to attract the notice of English Civil Engineers to a resource well worthy of their attention. The Hindoo religion in deifying the great rivers, and inculcating on its disciples the necessity of constant ablutions, and the rewards held out to those who multiply the shrines and temples on the banks of the sacred waters, have been the cause, in all probability, of the adoption of this system of foundation. In an alluvium so extensive, and so moveable, piles, were they used, would have been found inefficient; the native engineer, however, has no machinery with which piles of a sufficient length could be driven; timber, moreover, at those places where the greatest demand would have existed, could not have been procured without great difficulty, and very great expense. The means of making bricks, on the contrary, were at hand; the labourers required to build masonry and to sink wells were to be found in the neighbourhood; the solidity of structure was withal more pleasing both to the projectors and to the builders; and the idea once adopted, the use of wells not only on the edges of the river, but in all places where the badness of the soil and the height of spring water rendered excavation impracticable, has been acknowledged as the standing resource in the system of hydraulic architecture of Upper India. At Muttra, Bindrabund, &c. where flights of steps or ghâts sweep the whole line of the Ganges within the limits of the respective towns, wells have been extensively used in foundations. The Mussulman buildings at Agra are largely indebted to wells, where the proximity of the Jumna made a depth of foundation necessary; the Doab Canal works have paid equal homage to this admirable native conception, and it is from these works that I shall collect data to enable the reader not only to comprehend the method which is put into practice when wells are used, but also to draw a comparison between their value as the means of foundation, and that of piles and other methods in use elsewhere.

The Chah-kun (from چاہ a *well*, and کن the affix from کندن *to dig*,) or well-sinker is a distinct trade scattered throughout the villages of Upper India. Its followers are called into requisition either for sinking new, or for clearing out old wells; in the former case, generally doing their work by contract, at a fixed rate per *hâth* or eighteen inches of depth of sinking, and in the latter by the job, or so much for clearing out the well and rendering it fit for use. The expertness of this class of people depends very much, of course, upon practice, and the depth of wells to which the Chah-kun has been accustomed. In a country where the undersinking does not exceed

ten or twenty feet, the well-sinkers will profess their inability, or decline to contract for greater depths; in fact where cylinders are required of from thirty to fifty feet, the Chah-kuns above mentioned would decline the undertaking altogether; the tools and method of using them in such a case, being quite different from what they have been accustomed to.

The tools in use by the Chah-kun consist of the *Phaora*, or common *Mamooti*,* as it is termed in the Ordnance Magazines, and the *Jham*, a large species of *Phaora*. The size of the *Jham* appears to vary according to the fancy of the well-sinker: in the cases which have come under my own observation, the blade has been usually twenty-seven inches wide by thirty-six inches long. The handle, which is short, but similar to that of the *Phaora*, is tied to the blade by a rod of strong iron wire, providing a support and means of attachment for the rope by which the machine is put into operation. The apparatus is a rough looking and barbarous affair, but well adapted to the use to which it is applied, and to the people by whom it is approved of.

In village well-sinking for the use of irrigation, or to supply the inhabitants with water for drinking and other purposes, where the supersoil is tenacious, and resting upon loose strata, in which the springs are found, it is usual to excavate through the upper soil down until water is reached; a ring of timber adapted to the thickness of the walls of the cylinder is then placed horizontally, upon which the masonry is built to a height of three or four feet above the surface level of the country; as the masonry advances, the outer surface is rubbed over with mortar, and the whole is allowed to obtain a moderate degree of induration by remaining untouched for at least ten days; at this period the Chah-kun, or well-sinker's aid is put in requisition. In the earlier stage of the proceedings, the Chah-kun carries on his work very easily, it is only when the cylinder has reached to a depth beyond that of himself, that the tedious and difficult part of his labours commence. After descending the well, and having in the first instance fixed a string and plummet to the top so as to secure a regularity in the depression, he commences by removing the soil from the centre, and then from the four sides respectively; the soil is brought up to the surface in baskets, and the Chah-kun at the top is in sole charge of the plummet and its movements. For the first three or four feet of sinking there is little fear of accident, and little trouble; in fact, up to this point I have frequently employed common labourers, who, with a little care and superintendence, have done the

* Query.—Whence this word?

work as efficiently as an experienced well-sinker. On the application of the *Jham* (vide supra) the top of the cylinder is loaded with logs of wood and heavy articles that may be at hand; a fork-like prop with a pulley is fixed in the ground, so that the rope which runs over the latter, and to which the *Jham* is fixed, should run centrically over the well; the Chah-kun then descends with the *Jham*, and with his hands and feet (for the natives use both with equal facility,) forces the instrument into the soil until it gets properly loaded, when it is drawn up, the contents removed, and the same operation is continued until the work is completed. After the soil has been removed beyond five or six feet below the surface of the water, the Chah-kun's duty is constant *diving*.* I have known them to remain half a minute and nearly a minute under water without any respiration. Each man is relieved at the end of the hour, and in hot weather the cold that they suffer in their escape from the well is severe to a degree; large fires are kept burning for them to recover themselves at, and a liberality on this point is one of the chief agreements between the well-sinker and his employer. In the cold season the annoyance from change of temperature is infinitely less, and the people themselves have often assured me that they could in this weather do twice the quantity of work, and with one-half of the labour to themselves, that they could do when the weather is hot, and when the evaporation was so rapid.

In describing the process required for the sinking of one well for common village purposes, we have only now to shew how the application of a number of these wells in conjunction can be turned to account for the purposes of securing a good foundation; for this purpose I shall give plans and sections of some of the works on the Doab Canal, explaining the method adopted in these works, and also shew how, under different circumstances, the same plan of foundation has been used with equal effect.

The course of operations depends on whether the wells used in foundation are placed close together, or at a distance. For piers of bridges with extensive waterway and heavy superstructure the former is usually adopted; in other cases, the wells are placed four feet apart, and connected together by masonry arches, upon which the wall, pier, or building is constructed.

In Canal works, however, it is often an object to obtain a running line of wall for foundation unbroken by divisions or points of separation, through which the substrata, when consisting of a loose sandy soil,

* In very deep wells, where the *neemchuck* exceeds twenty-five feet from the water's surface, the *Jham* is worked by long poles fixed to the handle, and the work is most tedious.

might escape, especially where there is a head water with springs opposed to it. In locks or descents, for instance, constructed in sand, where the subsoil in addition to its own natural spring water has that of the Canal to act upon the flooring of the lower chambers, there is a considerable tendency to the removal of the sand under these lower floorings, which seriously affects the stability of a work, and is only to be provided against by enclosing all the subsoil in continuous lines of foundation. I shall hereafter describe a remedy invented by Col. John Colvin, C. B. of the Engineers, formerly Superintendent of the Delhi, and Superintendent General of, Canals; but in the meantime it is evident that where wells or cylinders are used, the continuity of a wall is imperfect under any circumstances; for place them as close together as possible, there is still a separation—the curtain so much desired is wanting. The methods adopted by me in the two cases, first, where wells are sunk *close together*, or leaving a space of six or eight inches, which is the least that can be safely given, and, secondly, when at a greater distance apart, are these—piles, and as the English engineers now term it, *concrete* (an article which, I may observe in passing, has been in use in Hindoostan from time immemorial); the former in the works on the Doab Canal varying from sixteen to five and a half feet in length, and the latter laid in as deeply as possible between the piles, and allowed to stand for some days to settle and indurate. The piles are made of young Saul trees *(Shorea robusta)* cut in the forests in the northern slope of the Sewalik hills, in the Deyra Dhoon; or when only five and a half feet long, of the species of rafter called by the natives *Kurri*, the smaller sort averaging from ten to twelve feet long and three and a half inches square, sawed out of Saul timber in the forest, and imported in immense abundance into the plains swung on the back of bullocks by the Brinjarris, or class of people who lead a roving life, employing their cattle in this species of work. The concrete consists of *kunker*, an alluvial lime rock peculiar to India—of stone boulders from the river broken into fragments—the *gutta* or refuse of lime kilns, mixed with a proportion of cement, consisting of two or three parts of *soorkhee*, or pounded brick, and one part of the best stone lime thrown in and well mixed together with a pole, sharp at one end and blunt at the other; the former to stir up the mixture for a certain time, and the latter to ram it down until it is properly placed in position.

The figures in plates 1 and 2 represent these methods in detail, with the *neemchuck* and tools used by the well-sinkers; and in plate 4, which is a plan and section of falls and locks as constructed on the Doab Canal, the application of both will be easily recognized.

The depth to which a cylinder of six feet in the diameter can be sunk during the day by one party of well-sinkers through a sandy stratum as far as ten feet, varies from two and a half feet to four inches. It is desirable when the well has to be sunk to this depth only, to expedite the depression of the three or four last feet as much as possible, so as to get the cylinder to its full depth, without leaving it during the night, and allowing the loose soil to settle round it, and give it a firm embrace. It is very difficult at times to free the sides of the cylinder from the hold which the sand has in this case upon them, but even with a very heavy weight applied to the top half a day may be expended in this way, without getting the well to move at all—a remark equally applicable in pile-driving through sand, where the advantages of driving the last pile that is driven during the day to its full depth, is well known. I have seen a pile, length twenty feet and diameter eight inches, which has been driven ten feet on the previous evening, resist on the next morning the weight of the pile engine for forty successive strokes—the weight of 250 lbs. falling through a space of ten feet, the head of the pile becoming perfectly shattered and useless. The following table will give an approximation to the expense of sinking cylinders of the above mentioned diameter to a depth of ten feet, and although the difficulties attending the operations from which this table was formed were greater than would be generally experienced, a very tolerable idea of the expense of well-sinking will be exhibited.

Soil, sandy, mixed with clay, but free from stones or kunkur; full of springs, with the canal head water ten feet above the point at which the cylinder commenced sinking; outer diameter of well six feet, and in some instances eight feet, and inner diameter four and six feet respectively; machinery employed night and day in keeping the water down to the level on which the wells were built; windlass used with the *Jham;* period of operation between January and May.

Well Sinkers.	Windlass men.	Labourers.	Carpenters.	Smiths.	Sundries, Rope, Iron, Leather, Oil &c. &c.			Expense in labour.			Total expense.			Length of well or cylinder sunk in running feet.
					RS.	A.	P.	RS.	A.	P.	RS.	A.	P.	
1267	1688	358	30	30	10	10	2	439	5	10	450	0	0	202½

Or average per running foot Rs. 2:0:4

The cost of building a cylinder of the above diameter, viz. 6 feet and 10 feet high, may be thus—

Labourers, ...	9	0	0
2050 bricks, $12 \times 6 \times 2$..	10	4	0
16 maunds stone lime, ..	6	0	0
Neemchuk or curb, ...	2	12	0
Total cost,..	28	0	0, or per foot 2 : 12 : 10

giving the average cost of well-sinking, using a cylinder of six feet in diameter and carried to a depth of ten feet at Rs. 4 : 13 : 2 per running foot. In the above table, however, as I before remarked, the items are dependent on difficulties which in well-sinking from a plain surface—from the level of a garden for instance—would not be met with. In wells situated in this way, and of similar dimensions in every respect to those upon which our data are formed, the expense varies at from three rupees six annas to four rupees per running foot, the difference depending on the cost of labourers—the price of materials remaining constant. The masonry of well-building I have generally found to vary from eighteen to twenty rupees per 100 cubic feet.

In wells of from sixteen to twenty feet depth the expense per running foot has been found to vary from Rs. 7-8 to Rs. 8-8, using the cylinder above noted; to a greater depth, however, they require to be of larger dimensions; but it would be interesting to discover the progressive advance in expense on each ten feet of well-sinking; it would possibly advance in a series with a common multiplier of two, leading to the following table as an approximation—the upper line representing depths of cylinder in feet up to fifty, the second the cost per running foot, and the lower the actual cost of well at each depth as noted in the upper line.

10 ft.	20 ft.	30 ft.	40 ft.	50 ft.
4 Rs.	8 Rs.	16 Rs.		
40 Rs.	160 Rs.	480 Rs.		

The two first columns are formed on my own practical observation, and the third is from the cost of village wells, extracted from the statistical notes of the Revenue Surveyors in the upper portion of the Doab, *plus* the expense of undersinking the first sixteen or twenty feet, which in village wells is generally built up. Whether the progression which holds in these may be extended further, as I have proposed in the fourth and fifth columns, may be easily shewn by reference to the Engineer officers who built the bridges on the East Kallee Nuddee, and Hindun rivers; (to Captain Debude, and Lieutenant Alcock,

* The M.S. is blank in these spaces.—Eds.

these notes are especially addressed); the piers of the Hindun bridge resting on wells up to the limit of the table above proposed.

It must be recollected that the cylinders are supposed to be undersunk from the commencement through a sandy soil, and with spring water at the surface—as must usually occur in foundations where the application of them for that purpose would be necessary. The cost of village wells, which although thirty or forty feet deep are only undersunk on reaching the springs, is proportionably less.

With reference to the value of obtaining a connected curtain, or line of running wall in foundation, where the interference of spring water renders undersinking necessary, Colonel Colvin, C. B. of the Bengal Engineers, proposed a plan of sinking square masses or parallelopipedons of masonry, piercing these masses by wells, as represented in Fig. 1. Pl. 3. The plan succeeded in every respect. In those of from ten to fifteen feet long and four feet wide, undersinking to a depth of ten feet in sand mixed with small shingle was carried into execution with perfect success in the foundations of the dam over the Somhe river. Water was, at the point where the dam had to be constructed, immediately on the surface; the object of the dam was to retain the supply of water to a considerable height to throw it into the Delhi Canal, and maintain a supply during the dry months. Circular wells were objectionable for the reasons which I have before explained, and it was a desideratum to get such a foundation, that the head pressure of water should affect the leakage *under* the dam as little as possible. Fig. 1. Pl. 3. will explain the method adopted, the spaces between the boxes on the first row being covered by those in the second line.

The method put into practice in sinking these masses is similar to that in cylinders, but greater care is required in regulating the operation of the well-sinkers, so that the mass may be lowered equally. The curb, or *neemchuk*, is a platform of wood equal in size to the base of the masonry, with round or oval holes cut for the wells, as shewn in Fig. 1. Pl. 3. I have used these masses in lengths of twenty-one, feet, by four feet wide, to a depth of ten feet, with perfect success, giving three wells in each. I should however limit the dimensions to fifteen feet by four feet, with two wells elliptical, five feet by two and a half each, which with proper care will be sunk to a depth of ten feet through sand without any difficulty. There appears no reason why a whole foundation of a work within certain limits might not be sunk in this way. It is often a difficult matter to obtain foundation for a bridge with an arch of twenty feet span where the soil is sand although the drainage is not liable to freshes or any violence of current. A bridge of this sort, with a roadway of fifteen feet, would

require a mass in superficial area equal to twenty-eight feet by eighteen, to a depth say of from six to ten feet, which would be quite sufficient, even if the mass rested on sand. There is no reason why, by piercing this block with cylinders, the whole might not be lowered, and a foundation obtained of infinitely greater security, and certainly not at greater expense, than any of the methods now adopted. The great advantage however of this plan over others, is its simplicity; all the apparatus, machinery, &c. of pileing are thrown aside; a few carpenters procurable at every village, and masons to be had without difficulty, with some Chah-kuns to sink the mass, are all that is required.

Where stone in slabs is to be procured, a method is adopted by the natives of forming what they call *kothis*, that is to say a caisson without a bottom. The stones are clamped together, as shewn in Fig. 3. Pl. 3, by wooden clamps; these boxes are undersunk in the same way as the cylinder, but the form is inconvenient, and the difficulty of sinking them greater than either the cylinder or the block above described. The circular form as regards friction alone, offers a much smaller surface than the square; but the square block of Colonel Colvin has great weight to assist its descent, which the stone *kothi* has not. In the foundations of the bridge over the Caramnassa river, laid down by Nana Farnavis, these *kothis* were extensively used. These foundations when laid bare for the ulterior operations appear to have extended across the bed of the river on a width of sixty feet, the *kothis*, which were fifteen feet square, being placed close together, and sunk through sand to a depth of twenty feet. The reader is however referred to Vol. 3. of the Gleanings in Science, in which Mr. James Prinsep has given a most interesting detail of the Caramnassa bridge operations. I may however remark that the *kothis* in question after being sunk are filled with *grouting*, or a mixture of lime, kunkur, &c. (concrete) forming an artificial conglomerate, upon which the superstructure is raised. Mr. Prinsep uses the word *dhoka*, in this part of India *ghutta* is the term usually applied to this species of material. The *jamwat* corresponds with the *neemchuk* of the northern Doab.

Another species of *kothi*, which is also used not only in foundations but in village wells, consists of frames of wood joined together at the angles, as represented in Fig. 4. Pl. 3; this from the want of weight is still more difficult to sink than the one before described; it is however convenient where wood is plentiful, and the soil to be pierced of a light description; they are undersunk precisely in the same way as the common cylinder. In village wells, when the *kothi* is from four to five feet square and the thickness or scantling of the wood used four or five

inches, it lasts for many years, and merely requires repair in the upper portion, where its exposure to the atmosphere tends to the destruction of the material.

The *Sundook*, or box, is another, and perhaps the most awkward of all methods to obtain a depth of foundation; it is adopted by the natives, but generally where there are no experienced workmen. The plan and form of this box is represented in Fig. 5. Pl. 3; the size generally about ten feet long by five feet wide, and depth not exceeding five feet. The size of the box being lined out on the ground where it has to be sunk, a pointed timber six feet long, or thereabout, and four inches square, is driven into the ground at each corner, two inch planks are then nailed on the uprights, and the whole made as strong as possible, either by additional uprights on the sides or by transoms; the soil is then removed from the inside, and the depression goes on by driving the uprights down with mallets, as fast as the removal of the soil from the inside will admit of it. As may be supposed the frame work is liable to disarrangement in every way; when sunk to its full depth the interior is filled with *grouting* (concrete) and the heads of the corner piles or uprights sawed off. These foundations are allowed to stand for a year at least before the superstructure is commenced.

Pileing as the means of foundation, appears, as far as my observation has gone, to be totally unknown throughout Hindusthan. I have never met with it under any form, or under any modification. The fact is, that labour is so cheap in India, that it is less expensive to adopt any means for purposes of this sort with *manual* labor, than with *machinery!* That the value of the latter would in the course of time be most justly appreciated, there can be no doubt; but the philanthropy of the existing generation has not arrived at that point which would lead the builder of a Ghat or of a Musjid to *experimentalize*, when he has before him a secure, and well authenticated method of operation.

To recur to the wells or cylinders, it is usual to fill them with *grouting* of lime, kunkur, and broken brick, so as to make a solid mass of the whole for the superstructure to rest upon. This may be necessary where the wells are sunk to a great depth, and where the superstructure is of great weight, but in other cases the value or necessity of such an arrangement may be doubtful. The wells used by me have never exceeded twenty feet in depth, the greatest number only ten. From their position they are in some instances liable to be undermined by a current setting in upon them when supporting a revetment or line of ghat, or in the case of locks from under-currents, and I have inva-

riably filled the cylinder with large masses of kunkur, or vitrified brick, *without* cement of any description, on the principle, that if the stratum upon which the cylinder rested was at all acted upon or undermined, the masses of loose material would sink and occupy the space caused by the action of the water below; in fact the hollow cylinders are quite sufficient to support the superstructure placed upon them, the internal space may therefore be well occupied by any means to counteract danger from the vagaries of the stream.

The varieties of lime procurable between the Himalayas and Delhi are peculiarly favourable to hydraulic works. The beds of the rivers which drain the valley of Deyra, situated between the parent mountains and the Siwaliks, are loaded with boulders of lime rock; the shingle strata of the Siwaliks themselves contain also a plentiful supply; these, with the main outlets of the Jumna and Ganges provide lime for all the upper portion of this Doab. The boulders are collected and either burnt on the spot, or carried to the works; in the former instance the cost of the material from the Hills to points between them and the town of Saharunpoor averages as follows:—

	Rs.	
Cost ₹ 100 maunds at the Kiln from 8 to 10 Rs. say,	10	0
Carriage of ditto to the works at ₹ mds. 3 to 3½ As. say,	21	14
Custom levied at the Ghats or passes in the Siwaliks, say, ½ an anna ₹ bullock load	2	2
Total cost ₹ 100 mds.	34	0

Although this lime is in many cases pure, i. e. crystalline carbonate without admixture—and by selecting the boulders previously to burning may be obtained sufficiently pure for the whitest stucco, or white-wash—the article from the kilns is much adulterated with clays and metallic oxydes, arising from the varieties of lime rock which are thrown into the beds of the rivers. With the use of soorkhee therefore (or pounded brick) this lime makes an admirable water-cement. In wells and foundations I have generally used it in the following proportions:—

2 parts Soorkhee
1 ditto Lime, or

5 maunds, or 400 lbs. of Soorkhee
1¾ maunds, or 140 lbs. of Stone Lime

mixed well together in a mortar mill before it is used. Above the level of the water I have found it advisable to reduce the quantity of soorkhee; the cement in this case consists of

1½ parts of Soorkhee, or 3¾ maunds
1 ditto of Lime, or 1¾ maunds.

The lime in fact is so good, that where well burnt bricks are used, bad masonry is entirely out of the question; the builder cannot help himself, and for this portion of his duty deserves no sort of credit whatever.

This stone lime is used universally on the Doab Canal from the point where it leaves the Jumna to Rampoor, a town twelve miles south of Saharunpoor; from this the marles and kunkur limes of the districts come into use, although the stone lime is brought into requisition on a smaller scale for arch-work as well as parapets; and in plaistering masonry works it is solely used.

The marle, or earth lime as it is usually called, is in much greater abundance on this line than kunkur. When extracted from the quarries or pits, it is perfectly soft and friable, in which state it is kneaded up into round balls about two or three inches in diameter, which are placed in the sun to dry, previously to their being burnt in the kiln. The marles differ very much in quality, but all of them make an admirable water cement. That from Jussool, a village on the Khadir of the Hindun river is the most approved of, and is delivered on the works within a circle of ten and fifteen miles at about twelve Rupees per 100 maunds. These marles are full of fresh water shells of species now existing in all the tanks, jheels, and rivers of the country; those of *Melania*, *Lymnæa*, and *Planorbis* being in the greatest abundance.

The kunkur limes are more numerous in the southern districts of the Canal, they also make a good water cement, but contain no remains of fresh water exuviæ.

Near a village called Hursoroo, twenty-five miles to the south-west of Delhi, a very superior kunkur lime is procured—the formation itself is intermediate between kunkur and marle, but the position of the quarries from which it is excavated is similar to that in which all this material is procured, in a low tract of country, the site in all probability of a lake or jheel now filled up.* The same fresh water shells as are found in the marles to the eastward of the Jumna, are very numerous in the Hursoroo lime. It is exported in large blocks, and is sold in Delhi at from twelve to fifteen Rupees per 100 maunds. The cost after burning varies from twenty five to thirty Rupees per 100. This lime for a water cement is very far superior to any lime that I have met with. When calcined it is of a very light color, and

* Hursoroo is situated on a nullah which rises in the small hills near the Kotub Minar, and flows into the southwest end of the Furruknuggur jheel. The town of Hursoroo, or as it is more commonly called Hursoroo ghurree, is about two miles from the jheel.

might be mistaken for the stone lime of the Northern Division. In the locks and works on the Doab Canal, appended to them at Shukulpoor, Sikrani, and Jaoli, in the southern district opposite Delhi, nothing but Hursoroo in the following proportions has been used in the superstructure,

1 part of Hursoroo.*
1½ ditto of Bujree,

and in the neighbourhood of Delhi the use of pounded brick, or soorkhee, has been almost entirely superseded by that of Bujree.†

The sand stone, which is an attendant upon the great Quartzoze formation of the ridge upon which Tughlukabad, the Kotub Minar, and old and new Delhi stand, varies from compact and crystalline, to a loose and friable rock; in this latter case it consists of an agglutination of minute angular fragments of quartz, with, in some cases, a red oxyde of iron in such abundance as to give the strata quite a peculiar character; in other cases the oxyde is wanting, and this friable rock is of a light color. For roads and other purposes these varieties of the sand stone are much in request, and amongst the natives obtain the name of *Bujree*. Nothing could be a better substitute for soorkhee, than the substance in question. The presence of the iron oxyde is in every way favorable to its value in hydraulic works, and the sharpness of the particle of which it is composed renders it an admirable mixture with lime for plaister or stucco. In this form it stands the effect of the climate much better than soorkhee or river sand. In the proportion of one part of Hursoroo lime to one part of bujree, mortar laid on with a float, as is used in sand, may be considered very far superior to it, and with a much better appearance than that practised by the natives, under the tedious process of beating with the *thappa*. This bujree is now universally used on the Doab Canal works, at all points at which it can be delivered under eight rupees per 100 maunds, this being the maximum rate of

* The following is the detail of proportions used in the cement at these works, and as they were built in 1831-35, a sufficient time has elapsed to judge of the durability of the masonry, no repair of any description having taken place up to this period.

Foundations including Floorings, &c.	Hursoroo Lime,	1	part.
	Earth Lime,	2	,,
	Bujree,	2	,,
Superstructure,	Hursoroo Lime,	1	,,
	Bujree,	1½	,,
Plaister,	Hursoroo Lime,	1	,,
	Bujree,	1	,,
Sundulla or outer thin coating given to the plaister, as a finish.	Stone Lime,	8	,,
	Soorkhee,	1	,,

† This has I believe been the case in the Delhi works for many years.

pounded brick. For water cement the Hursoroo lime with a proper proportion of this red bujree may perhaps be considered as superior to all others attainable in this part of the world.

In conclusion:—the Saul *(Shorea robusta)* which is found in great quantities in the Deyra Dhoon, and especially on the northern slope of the Sewaliks, is the wood chiefly used on the Canal works for piles, rafters, lock gates, sleepers, windlasses, vanes, &c. &c. The Sissoo *(Dalbergia sissoo)*, Toon *(Cedrela toona)*, Sirr *(Acacia serissa)*, are used in doors, door frames, mill machinery, &c. For handles of tools, pickaxes, phaoras, arbors of mill wheels, &c. the *Acacia catechu* (or *Kyr*) the wood from which the *Terra japonica* of commerce is procured, and which grows in great abundance in the forests south of the Sewaliks, and the *Acacia arabica* (or *Keekur*) are chiefly in request. For Neemchuks of wells the natives always select the Dhák or Plass *(Butea frondosa)*, and if this is not to be had prefer the wood of the *Ficus Indica, F Bengalensis, Bombax Malabaricus* (*Semmul,* or cotton tree); the Horse radish tree (the *Hyperanthera morunga* of botanists) is also used:—in fact, all the light woods which are valued as floats for rafting timbers are considered better than others for the curbs of wells. The Neem *(Melia azadirachta)* is a useful wood for small rafters, door frames, &c. from being less liable to the attack of white ants. A variety of Pine *(Pinus longifolia)* which grows in extensive forests in the Sewalik mountains is held in no esteem by the natives; it is good for making light boxes and common furniture, but in attempting to bring it into use on the works I have failed; very capital tar,* however, is procured from it, as well as turpentine.

To Mr. acting Sub-Conductor John Pigott, Overseer of the northern division of the Canal, under whose charge the greater part of the works from which the above data on well-foundations have been formed, I am indebted for much valuable aid; his introduction of the windlass in sinking wells has not only led to a great saving of expense, but added much to the facility of depressing them. His general quickness, moreover, at resources under sudden and unexpected difficulties, which can only be appreciated by those who have seen the effects of the *Roas*, or mountain torrents in the rainy months, is deserving of the best acknowledgment that I can offer him.

Northern Doab, May 8th, 1839.

* Vide vol. 2 page 249, of the Journal. The Editor here uses the word *turpentine* for *tar*. The manufacture of tar, and *not* turpentine is described: the error was not corrected at the time.—*Author's note.*



...MENT OF A HINDU COLUMN AT KUSSA
...AR ALLAHABAD.

...ithoc. Z.L.S. Lith.



THE PUBNA PILLAR

...ed Lith.



FRAGMENT OF A HINDU COLUMN AT KUSRA NEAR ALLAHABAD.

M. Kittoe del. & Lith.



THE PUBNA PILLAR

Oriental Lith. Ins.

Tea Tracts

in the Muttuck Country				in the Singpho Cy	
Nudwah	3	Morrie Patar	1	Ningrew	1
Deenjoy	1	Boogdone	1	Kaunung	1
Chubwah	3	Hinga Beel	1	Kyudoo	3
Gurbandy	1	Ihlahdury	1	Genlong	1
Tingre	3	Deam	2	Jugundoo	1
Geelah Jhan	1	Madar Khat	1	Jugto	1
Koorkany Tingre road	1	Ecoratolly	1	Namcheek	1
Bazalany Dº	1	Singallee Jhan	2	Terap Panee	3
Kahung	10	Timon	1		
Nowholeah	5	Lahoal	1	W of Boree Dihing R.	
Dig Boy	2	Nauckjoy	2	Hooken Joree	1
Kolo	2	Mahout Gt	1	N. of Dº	1
Koreemeah	1	Burhally	1	S. of Dº	1
Hamp Jhan	2	Koneker	2	Namsung R.	1
Above Koreemeah	1	Buttallee Khat	5	Bursally	1
Hogoree Jhan	2	Polongah	1	Rookan Hawy	1
Quary goeah	5	Saumcutter Beel	1	Towcock	1
Coolie Vellage	2	Pabo Jhan	2	Cherido	1
Kar Jhan Chuprie	1	Gundia	2	Gabrew Purbut	7
Tipum	1	Nahoregoeree	2	Hout Hoeah	13
Changdooreah	1	Total	80	Total	40

Muttuck	80
Singpho	12
W. of Boree Dihing R.	28
Grand Total	120

MAP OF

MUTTUCK, SINGPHO,

and

the Country West of the Booree Dihing River

Shewing all the Tea Tracts that have hitherto been discovered, by Mr C. A. Bruce, Superintendent of Tea Culture to the Hon.ble East India Compy in Assam.

Jypore 1st June 1839.

Scale. 8 Miles to an Inch.

Oriental Lith.c Press - Calcutta.

Art. IX.—*Proceedings of the Asiatic Society.*

(*Wednesday Evening, 3rd April*, 1839.)

At a Meeting held at the Grand Jury Room of the Supreme Court.

The Honorable Sir E. Ryan, President, in the chair.

The Proceedings of the last Meeting were read.

Read a letter from the Secretary of the American Philosophical Society, acknowledging the receipt of numbers of the Journal of the Asiatic Society.

Read a letter from Professor Lassen to the address of Mr. James Prinsep.

(The substance of this letter has been published in the New Series of the Journal for February last.)

Read a letter from M. Burnouf, Secretary to the Asiatic Society of Paris, acknowledging the receipt of the "*Mahabharata*," vol. 3rd, transmitted for sale in France.

Library.

Read a letter from J. P. Grant, Esq. Secretary to the Government of India, Revenue Department, forwarding for inspection of the Society a copy of the 6th No. of Dr. R. Wight's Icones Plantarum.

Illustrations of Ornithology, Nos. 3 and 4,—*purchased by the Society.*

History of British Birds, by W. Yarrell, part 9th—*purchased by the Society.*

Literary and Antiquities.

Read a letter from H. T. Prinsep, Esq. Secretary to the Government of India, Political Department, forwarding for deposit in the Society's Museum, coins and reliques of M. Masson's collection, being duplicates selected by Mr. Cracroft at the time he took charge of the original collection.

Read the subjoined letter from Mons. De Paravey, Royal Engineers (French), to the President. Mons. D. Paravey urges the publication, at the expense of the government or of some public institution, of the valuable Chinese work (M. S.) on Geography and History in 70 vols. now in the Royal Library of Paris.

"*A Monsieur Le Président de la Société Royale de Calcutta.*

"Monsieur le President.—J'ai l' honneur de vous addresser, pour être déposer sur le Bureau de votre Honorable Société trois opuscules, publies dans le but de faire ordonner pour quelque académie ou quelque gouvernment eclairé la traduction, possible en Europe en ce moment des principaux livres Chinois relatif à l'histoire et a la géographie. Par une fatale dispósition aux futilités depuis M. Deguegner on n'a traduié du Chinois, que des Romans et des pieces de Théâtre, et on ne-nous a donné aussi que des Pieces de Theatre fort ennuyeuses, en tout au plus bornées a nous faire connoitre quelques détails de mœurs. Il y a, en Chine, d'autre trésors à puiser; et il appartiendroit à votre Honorable Société d'obtenir de la Société ou de la compagnie des Indes, l' Impression, a ses frais, de la traduction, possible à Paris, en ce moment da Pian-y-tien, immense ouvrage relatif à la géographie des pays qui entourent la Chine, tels quel' Indo-Chine, la petite et la grande Boukharie, la Corée, le Japon, et meme l' Amerique qui y est decrite sur le nom de 扶 FOU' 桑 SANG ou de pays de l'orient extreme. J'ai montre ce bel ouvrage en 70 volumes (envoyé de Peking a Paris par les missionaires il y a plus d'un an) à Lord Munster, dans un hyver qu'il a passé

ici, et je lui ai fais voir qu'il figuroit les peuples Etrangers de la Chine, et meme ceux de l'Afrique, et donnoit la titre de toutes les productions de leur pays, et des details sur le commerce que lui y pouvoit faire, et je suis surpris qu'a son retour à Londres, Lord Munster n'aie pas engagé la Société des traductions a faire traduire a Paris, par M. Stanislan Julien, cet ouvrage si important, pour la puissance Angloise dans les Indes et cher les Birmans. Ce livre a été entièrement parcouru par moi, et souvent cité dans la belle Histoire des Hums de M. Deguegner le pere, mais ce qui manque a l'Europe c'est la traduction complete, et possible en ce moment je le répéte, encore. J'en ai aussi entretenue M. le Baron de Humboldt par ecrit; il est actuellement a Paris et je ne doute pas qu' il ne s'en occupe un jour.

"J'ai voulu, Monsieur le Président, appeler aussi votre attention sur ce livre si importan, qui n'existe pas à Londres autant que j'ai pu le verifier. Il seroit non moins utile, d'avoir une traduction complete des kiags et du Son Chon ancienne chronique, et des encyclopedies diverses publieés en Chine et au Japon, aussi bien que du Pentho Penggmon; je suis convaincu de leur haute importance. Je désire en convainere aussi votre Honorable Assemblée.

"Je suis avec respect,
"Monsieur le Président,
"Votre tres humble et obeissant serviteur,
"CHEV. DE PARAVEY.

Ce 13th Septembre, 1838. Du Corps royal du génie, &c. &c.

The Secretaries were directed to acknowledge with thanks Mons. De Paravey's communication, and to state that several works of more local interest must occupy the attention of the Society before they could urge on the government the expediency of undertaking the translation Mons. De Paravey suggests.

Received through the Secretary to Government, General Department, Report on the Statistics of Azimgurh, by Mr. Thomason, B.C.S.; also Journal of a Tour in Bootan, by Dr. W. Griffiths, Medical Establishment.

Read an application from Premchaund Pundit, offering to make over to the Society the commentary of the 2nd part of the "*Nyeshadha*," which he has been given to understand the Society is willing to publish; with a request that his labours for such compilation may be taken into the consideration of the Society.

Proposed by the President, seconded by Capt. Forbes, carried nem con, that Mr. Sutherland be requested to report on the subject at the next Meeting.

Daily Observations of the Tides at Singapore for December 1838, and January 1839, were presented by W. Scott, Esq.

Museum.

Read a letter from Dr. C. Griffiths, forwarding for presentation to the Museum a locust picked up by him at the Cape of Good Hope in December last.

Read extracts of a private letter to Dr. O'Shaughnessy from Lieut. Col. Stacy, communicating drawings of coins discovered on his journey to join the Army of the Indus.

* * * "You may rest assured, I will keep you informed of any thing which comes to my knowledge, and which I suppose may be interesting to you; but keep in mind, that the natives bury, and remove every thing they can on the approach of an army; and therefore, that I can expect no success in my researches, until we take Cabul. Through

the kindness of Moonshee Mohun Lal, I have received introductions to the bankers of Kandahar and Cabul: through their agency, I expect to procure coins, gems, and every thing antique, which money and zeal in the cause can procure; and I hope I shall be able to make such arrangements, when on the spot, as may secure to me the result of their future exertions. Not a coin shall pass into other hands, if I can prevent it. At Cabul I shall have some trouble perhaps; but we have this satisfaction, that if I should fail to secure any coins, they will fall into the hands of our countrymen, and they will communicate them to the Society. I had better begin the subject of coins in the order or date of my great good fortune. First, when travelling dâk, I had the pleasure of meeting Dr. Falconer on his return from Cashmere; he immediately opened his treasures, gave me over almost all he had, desiring I should select such as I required for my cabinet. Although no new coin turned up, still there are three of Kadaphes Choranus, which will be very useful, as having the legend on the reverse complete; there are some others also, which will be very useful in completing readings, which, at present, are rather doubtful.

"My next donation was from Colonel Sir Alexander Burnes: of his modern coins I will speak, when I have more time. In six small packets are Bactrian, Indo-Scythic, &c. which though published, will still be useful, as they assist in forming a comparative table of the various sites where these coins prevail. One coin in these packets deserves notice, viz. a copper coin of Azes—of capital workmanship and very complete—similar to fig. 2, pl. 22, vol. 4, June 1835, Journal Asiatic Society. Three circular copper coins of a dynasty as yet unknown, complete the valuable present of Col. Burnes: they deserve a more detailed description than I can give of them in Camp, without books of reference. I will describe them as well as I can, and send you sealing wax impressions by the first opportunity, into which you can cast Plaster of Paris.

"No. 1, *Obv.* Royal bust facing to the left, in high relief; handsome and expressive features; beard; head-dress difficult to describe; has the appearance of two large rosettes, composed the upper of six and lower of seven small circular bunches of flowers or jewels; the royal fillet passes between these, and is tied behind in a very peculiar triangular bow. Dress magnificent; collar round the neck equally so; legend in Greek characters—the three first are indistinct—they appear to me ΔCΔΛKOΡHC Basileus, the remaining letters lost. *Reverse.* An angel in outline, facing to the right, holding out a fillet in her right hand; the legend, beautifully executed, is in a character assimilating to, but more ancient, than the writing in the principal deposit of the Manickyala Tope—Monogram ⅂



"No. 2, is also a copper coin in high relief, and only less beautiful than No. 1. Royal bust facing to the left—evidently of the same dynasty. A less able execution of the medal, and a deteriorated Greek character, stamp it as subsequent to No. 1. Bearded—hair straight on the crown of the head—fillet with the same peculiar triangular bow as No. 1—below the fillet three rows of curls—dress much the same as No. 1—collar richer. It must be regretted that the greater part of the letters of the name are injured—after cleaning the coin with the greatest care, it appears Δ ⊃ ρ Θ Λ V H C * *, the remaining letters are lost. *Rev.* An angel facing to the right, in outline, holding out a fillet in her right hand—half of the legend is distinct—approaches nearer to the writing in the principal deposit Manickyala Tope—Monogram



Δ ⊃ ρ Θ Λ V H C

"No. 3. This coin was in such a ruinous condition, that I had no hopes any exertions would ever enable me even to class it; but I have been more fortunate than I expected. I think it should be placed as first of this series. It is evident it belongs to Nos. 1 and 2; equally so, that it is of some other king, for the Monogram is on the obverse—a star with five points. The head dress is the same—the ends of the fillet are more gracefully disposed. Style of Greek character the same as on No. 1. Only a few letters of Basileus remain. *Reverse.* An angel facing to the right—instead of being in outline the angel is filled in, and in a most graceful attitude—the traces of letters only remain, but as far as they allow of an opinion, I should say of a different alphabet from Nos. 1 and 2.

"Nos. 1 and 2 bring to light the names of two kings before unknown. Monsieur Jaquet's corrected *Pehlevi* alphabet will enable you to judge if I have read the Greek legend correctly. To Colonel Sir Alexander Burnes are we indebted for this discovery;—he does not allow his numerous and important duties to prevent his collecting ancient coins wherever they are to be had: he has dispatched servants in several directions to purchase them.

"My next good fortune was a donation from Moonshee Mohun Lal; he shewed me all the coins he had, and desired me to select any I wished to possess. I accepted of sixteen—two of these are unique, but I am sorry to say, without legend. One *Obv.* a head in high relief, looking to the left. *Reverse,* a loose horse, trotting to the right—legend lost. The other a bust, badly executed, looking to the right—crown with many points—*Reverse* lost. From the appearance, I doubt if ever it had a reverse. These two coins are both unknown. A square bronze coin of Eucratides. *Obv.* very complete, and in wonderfully good preservation, a splendid execution, not the least injured. *Reverse,* the two horsemen. Nothing can surpass the spirit and grace of this medal; I have no coin, nor do I remember seeing a coin of greater beauty. I also received a very pretty small coin of Ernaios or Ermæus; the others are coins already published. You may imagine how grateful I feel for these most acceptable donations. I hope on my return, that added to what my own exertions may enable me to collect, we may be able to give several names to the list of kings. I shall write from Kandahar"

Physical.

Read a letter from Lieut. Col. R. Lloyd, Resident at Darjeeling, forwarding a specimen and notice of a supposed Coal found near the Teesta river. On analysis it was found to be *iron* stone mixed with plumbago.

After the conclusion of the business of the Meeting Mr. Jameson, the officiating Curator, read his report on the specimens of Natural History contained in the Museum of the Society.

The thanks of the Society were voted to Mr. Jameson for the valuable service he has rendered to the Society, for the short time he has had the management of the Museum.

Meteorological Register, kept at the Assay Office, for the Month of April, 1839.

Day of the Month.	Forenoon, 10 A. M.															Afternoon, 4 P. M.												
	Atmospheric Pressure.		Temperature.				Hygrometry.			Aqueous tension.			Weather.			Atmospheric Pressure.		Temperature.	Hygrometry.			Aqueous tension.			Weather.			
													Wind.												Wind.			
	Old Stand. Barometer.	Height at 32 Fah.	River water.	Well water.	Air.	Dew point.	Depression.	Differential thermometer.	Hair Hygrometer.	By Dewpoint.	By Wet bulb.	By Hair Hygrometer.	Direction.	Force.	Aspect of Sky.	Old Stand. Barometer.	Height at 32 Fah.	Air.	Dew point.	Depression.	Differential thermometer.	Hair Hygrometer.	By Dewpoint.	By Wet bulb.	By Hair Hygrometer.	Direction.	Force.	Aspect of Sky.
1																												
2	29,869	29,871	83,9	79,4	87,5	56,8	8,5	8,5	88	37	65	74	S. W.	3	cumuli.	29,762	29,754	91,7	45,2	14,3	14,8	77	22	47	54	S. o.	1	fine.
3	,887	,880	83,7	78,8	86,0	59,0	8,7	8,4	88	25	65	74	S. e.	1½	cl.	,740	,743	92,0		13,2	13,0	80		52	59	S. e.	2½	cum. few.
4	,820	,815	84,0	79,2	86,7	63,0	8,7	8,6	88	28	65	74	S. w.	1	do.	,660	,656	96,4	49,0	20,5	21,7	64	22	33	36	S. w.	1½	do. small.
5	,721	,738	82,7	79,6	87,3	65,0	7,1	7,4	90	50	70	78	S. e.	1½	do.	,592	,581	97,0	51,5	16,0	17,2	72	23	45	66	S. E.	2	cum.
6	,763	,769	81,6	79,6	86,4	63,5	6,9	7,1	90	48	72	78	S. o.	3	cy.	,609	,614	93,4	57,5	12,3	13,0	82	31	55	63	S. e.	1½	do.few.ovrhd.
7																												
8	,716	,745	84,2	79,3	86,7	65,0	9,0	9,0	88	50	65	74	S.	5	cy. cir. str.	,629	,638	91,6	63,0	13,3	13,2	79	41	51	40	S. e.	3	cy. mist.
9	,739	,735			89,3	63,0	11,6	12,0	83	44	55	65	S. e.	3	overct.	,612	,614	95,5	64,0	13,0	14,3	80	37	55	59	S. e.	2	fine.
10	,756	,716	84,3	79,1	88,1	62,0	11,9	11,6	80	43	51	69	s. w.	1	cy. haze.	,631	,631	91,3	53,3	16,2	16,1	73	29	11	48	s. w.	1½	do.
11																												
12																												
13	,776	,763	84,7	79,8	89,1		10,7	10,7	86		60	70	S. w.	1½	overct.	,671	,650	97,0	61,5	15,3	14,7	79	32	40	57	s. e.	1½	cum. nimb.
14	,780	,771	85,3	80,0	89,5		10,5	9,4	88		60	71	S. w.	2½	cum. sct. few.	,681	,666	97,8	55,7	16,5	15,0	77	26	45	54	S. E.	3	cy.
15	,785	,774	85,7	80,2	89,5	64,7	8,1	8,8	89	45	67	76	S. e.	2½	do. do. do.	,658	,625	94,3	55,1	13,9	15,0	78	29	50	56	e. s. e.	1½	overct.
16	,670	,666	85,9	80,3	89,7	65,0	8,0	8,0	89	47	69	76	e. s. e.	2½	fine.	,570	,541	91,2	64,5	11,5	11,6	84	39	59	66	w. s. w.	1	misty.
17	,641	,627	85,7	79,7	89,1	65,3	8,5	8,0	89	47	67	76	S. E.	1	cy. haze.	,539	,511	94,5	64,0	10,3	10,1	87	38	61	72	S. E.	3½	cir. cum. few.
18	,659	,629	86,3	80,1	91,0	68,7	9,2	8,7	88	49	65	74	e. s. e.	3	overct. cl.	,585	,533	95,9	65,0	12,3	11,9	83	38	57	65	S. E.	3½	fine.
19	,800	,789	86,2	80,3	89,9	69,6	9,2	9,2	87	53	65	72	s. e.	0½	haze.	,725	,655	93,7	71,0	11,3	11,2	83	50	60	65	o. E.	3	shy. threatg.
20	,891	,840	87,5	80,1	90,1	71,0	9,8	9,5	85	55	62	68	s. e.	1	cum. str.	,779	,690	96,1	55,0	16,5	15,9	76	27	45	52	o. E.	2	overct. cl
21																												
22	,842	,780	87,4	79,9	89,7	70,0	13,2	11,2	80	55	50	59	s. E.	3	cir. cum.	,743	,652	93,8	61,5	14,6	16,0	79	37	50	57	S. w.	3	cir. cum.
23	,776	,695	86,6	80,3	89,7	73,5	8,8	10,0	89	61	66	76	S. e.	1	do. do.	,537	,522	96,0	62,5	13,3	12,0	83	31	55	65	S. o.	1½	nimb.shy.dk.
24	,591	,613	87,5	80,1	88,7	74,1	6,7	7,5	92	64	72	82	S. W.	5	cy. haze.	,485	,502	91,1	71,9	8,5	8,8	91	54	67	80	s. W.	2½	cir. cum. do.
25	,586	,581	87,9	80,3	90,9	71,7	7,8	10,1	89	60	70	76	S. W.	1	do.	,481	,461	91,0	71,1	8,5	9,0	90	59	67	89	S. e.	3	cy. do.
26	,580	,587	87,2	80,1	88,9	74,0	6,5	7,5	92	63	75	83	S. o.	1	do. threatg.	,486	,488	89,9	73,2	5,7	6,7	93	60	77	81	S. e.	3½	do. do.
27	,580	,588	85,3	79,5	87,1	76,3	7,3	8,8	89	70	70	59	S. W.	5	do. do.	,449	,426	95,5	64,7	15,5	16,8	79	37	47	57	S. e.	2	overct ?
28													S. W.															
29	,575	,573	86,2	80,2	90,9	75,7	8,7	9,1	90	70	67	78	S. W.	1½	cum. str.	,469	,481	92,1	74,0	6,1	6,3	91	57	13	80	n. e.	2	Storm.
30	,607	,602	86,1	80,5	90,5	76,0	7,2	7,9	91	71	72	80	S. W.	1	cir cm.ovrhd.	,509	,480	92,2	77,0	8,0	8,7	91	63	70	80			cum.str.&cm.
31																												
																		91,3	69,2	12,8	13,0	81	38	53	62		2½	Showers

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